COLUMBIA LIBRARIES OFFSITE
HEALTH SCIENCES RESTRICTED
HR02228696

RECAP

ANNUAL REPORT
OF THE
Ohio State Board of Health.

1897.

SERIAL

Columbia University
in the City of New York

College of Physicians and Surgeons

Library

Twelfth Annual Report

COLUMBIA
UNIVERSITY
LIBRARY

OF THE

STATE
Board of Health

OF THE

STATE OF OHIO

FOR THE

Year Ending October 31, 1897.

Norwalk, Ohio,
THE LANING PRINTING COMPANY,
1898.

Digitized by the Internet Archive
in 2010 with funding from
Columbia University Libraries

http://www.archive.org/details/annualreportofst1897ohio

Ohio State Board of Health,
Office of the Secretary,
Columbus, Ohio, February 21, 1898.

To His Excellency, Asa S. Bushnell, Governor of Ohio:

Sir: In accordance with section 8 of an "Act to create and establish a State Board of Health," the accompanying report is herewith submitted for the year ending October 31, 1897.

Respectfully,

C. O. Probst, M. D., Secretary.

251558

MEMBERS OF THE STATE BOARD OF HEALTH.

*Wm. T. Miller, M. D., Cleveland	December, 1897
Thos. C. Hoover, M. D., President, Columbus	December, 1898
R. D. Kahle, M. D., Vice President, Lima	December, 1899
Josiah Hartzell, Ph. D., Canton	December, 1900
†Wm. T. Gemmill, M. D., Forest	December, 1901
B. Stanton, M. D., Cincinnati	December, 1902
J. C. Crossland, M. D., Zanesville	December, 1903
C. O. Probst, M. D., Secretary.	

---

* Reappointed. Term expires 1904.

† Appointed to succeed E. T. Nelson, deceased.

General Report.

This is the twelfth annual report of the State Board of Health, and is for the year ended October 31, 1897. The reports of deaths and contagious diseases in cities and villages, and the annual reports of local boards of health, are for the calendar year.

PERSONNEL OF THE BOARD.

A change in the membership of the board was occasioned by the death of Professor Edward T. Nelson, of Delaware, who died February 28, 1897, and by the expiration of the term of office of Dr. S. P. Wise, of Millersburg. Dr. William T. Gemmill, of Forest, Hardin county, was appointed to fill the unexpired term of Prof. Nelson, for the term ending December 13, 1901, and Dr. J. C. Crossland, of Zanesville, was appointed to succeed Dr. Wise, for the term ending December 13, 1903.

MEETINGS OF THE BOARD.

The Board held five meetings during the year: three in Columbus and two in Cleveland. The January meeting, as usual, was followed by a joint meeting of the State and local boards of health. This meeting was largely attended, about 350 delegates being present, and the papers and discussions were interesting and instructive.

In this connection it may be mentioned that in Wood, Ross, Shelby, Crawford and Logan counties, county health associations have been formed, embracing the city, village and township boards of health. A representative of the State Board of Health has attended most of these associations, and assisted in their organization. They will undoubtedly be the means of securing a better enforcement of sanitary regulations in their respective counties.

HEALTH OF THE STATE.

As far as can be determined by obtainable data, the past year has been a favorable one, as regards the condition of the public health, when judged by the low standard which prevails. Diseases which might be prevented have carried off thousands, but wide spread epidemics have not occurred. Boards of health, for the most part, have been active in trying to limit the spread of contagious diseases; but without the hearty cooperation of the people whom they serve, boards of health can accomplish only in part the purpose for which they were established.

SMALL-POX.

Small-pox occurred in but four places during the year—Toledo, Dayton, Ironton and Westerville. In none of these outbreaks was it possible to trace the origin of the disease. In Toledo the disease became firmly established in the Polish quarters, where it was difficult to deal with, and it was by the good management of the local health department that an epidemic was prevented. There was a total of eighteen cases and three deaths in Toledo. In Dayton four cases of small-pox occurred among prisoners in the jail. The first person to be attacked had been in continuous confinement for forty-seven days, but the origin of his disease could not be determined. There was one case of small-pox in Ironton and one at Westerville. Prompt measures by the health authorities prevented any spread of the disease in either place.

TUBERCULOSIS.

Tuberculosis, diphtheria and typhoid fever continue to be the special scourges to which our people are subjected. All of these are to a large degree preventable.

The communicability of tuberculosis is now a firmly established fact. Heredity is no longer assigned the chief role in its production, though one may doubtless inherit a tendency towards the disease, *i. e.*, a weakened resisting power which leaves one prone to contract it under favoring conditions. Children born of tuberculous parents and *living at home* are placed, as one might say, between two fires. They are not only apt to be born with a weakened resistance to the disease, but, of much greater importance, they are constantly exposed to its specific cause—the *bacillus tuberculosis.* This is the chief cause of consumption and other forms of tuberculosis, this *close indoor* association with persons affected with the disease. And this cause is especially active where over crowding and bad ventilation exist.

From a theoretical standpoint consumption is one of the easiest to control of all the contagious or communicable diseases. The germ which produces it is found only in the sputum from the lungs, and this sputum does not liberate these germs until it becomes dry. Hence, by the simple means of at once disinfecting or destroying by burning the sputum, easily done at home, a consumptive may protect those about him. One would suppose that a father or mother for the protection of their children, or a husband or wife, for the protection of the other, would not fail to take this simple precaution. But experience shows that often this is not done. It must be that people do not really believe that consumption can be communicated in that way; for the love of kin, strong in all classes of men, leads them to give constant care in protecting their loved ones against dangers, when these are known.

Physicians often hesitate to pronounce what is considered by many as a death warrant, by telling the patient that he has consumption. Before the microscope was able to show us the germ of consumption in the sputum, there was reason to hesitate in making a positive diagnosis in the early stages of the disease; but now, when we can say that a person has consumption, is it not more than cruel to permit one to jeopardize his family by withholding from him this information? Physicians, who by calling and training are both sanitarians and samaritans, should lose no opportunity for impressing their patients, afflicted with this dreaded disease, with the fact that the safety of all with whom they intimately associate depends upon the carefulness with which instructions are carried out for disinfecting the sputum.

It is encouraging to note that the death rate from tubercular diseases is slowly decreasing, although it still remains the chief cause of death, one out of every seven of our population dying from some form of tubercular disease.

The health authorities of Cincinnati, following the lead of the board of health of New York city, have recently placed consumption among the contagious diseases required to be reported by physicians. Many good purposes may be served by having cases of this disease reported; and where the majority of the physicians are in favor of the enforcement of such a regulation, it is to be recommended. The State Board of Health, after inquiry made of each physician in the state, decided that it would be inexpedient at this time to attempt to enforce a general rule requiring reports of such cases. The Board has widely distributed a circular showing the true nature of consumption, and giving simple but ample precautions to prevent communication of the disease.

The city of Cincinnati has also recently set apart a hospital for the care and treatment of consumptive patients. This is a wise and humane measure. Many of these patients are placed in such surroundings that it is practically impossible to prevent them from infecting others; and if given the advantage of hospital treatment early in the disease they stand a chance for recovery. The duty of every large city in providing special hospitals for consumptives cannot be too strongly urged.

A knowledge of the contagiousness of consumption is slowly spreading among the people, and this will gradually lead to the better enforcement of measures for its prevention.

The fact has been fully established that tuberculosis in animals is the same disease, due to the same cause, as consumption or tuberculosis in man. Thousands of children die annually from tuberculosis of the bowels contracted by drinking milk from cows having this disease. When we consider that probably 15 to 18 per cent. of our milch cows have tuberculosis, and remember the number of children in early life who depend entirely on cows' milk for food, this great loss of infant life is not surprising. Stringent laws for the eradication of tuberculosis in animals are being enforced in some states. Nothing is being done in Ohio. The loss to the stock breeders is sufficient cause to warrant extreme measures for dealing with this problem, even if human life were not jeopardised.

The laws of Ohio already prohibit the sale of milk from diseased or sick cows. Boards of health would be warranted in prohibiting the sale of milk from cows having tuberculosis, and in employing proper means to determine the healthfulness of cows furnishing milk to their respective cities or villages. Tuberculin affords a reliable test for tuberculosis in cattle; and the supreme court of Minnesota has sustained the board of health in requiring that all cows furnishing milk to the city of Minneapolis shall be free from tuberculosis, as determined by the tuberculin test.

WATER SUPPLIES AND SEWERAGE.

Questions relating to water supplies and sewerage have continued to demand much of the Board's attention. The following places submitted to the Board for its approval plans for the introduction of public water supplies, or for the improvement of these already in use: Attica, Canton, Chagrin Falls, Hiram, Institution for the Blind at Columbus, Gibsonburg, Monroeville, Sabina, Shelby, Wauseon and West Alexandria. The Board disapproved of a new water supply proposed for Blanchester, and of proposed extensions of the water supplies of Lancaster and Wooster.

New sewerage systems for Cambridge and Glenville were approved. Changes or extensions of sewers already in use were approved as follows: In Cincinnati, Delphos, Hyde Park, Mt. Vernon, Middletown and Zanesville. Plans for sewerage or the extension of sewerage for the following places were disapproved: Bucyrus, Bluffton, Galion, Glenville (the first plans presented), Niles and Wyoming. Chillicothe, Glenville, Greenville, the Miami University, Toledo Hospital for Insane, and the Hardin County Infirmary presented plans, which were approved, for purifying their sewage.

The question of purifying sewage grows in importance each year. The Board has continued to discourage, and in some cases has prohibited the turning of raw sewage into rivers. In some instances this has caused a delay in the introduction of much needed sewerage systems because of the increased cost of purification works; but the general good, it is believed, has been served by protecting the streams against pollution.

We desire to call particular attention to an investigation of the streams of Ohio which has been begun by the State Board of Health. This work has been undertaken principally to enable the Board to carry out the intent of the law which places the introduction of public water supplies and system of sewerage under its supervision.

An excellent drainage map of Ohio has been prepared showing all streams and watersheds, the population on each, the location of towns obtaining a water supply from or contributing sewage to the streams, and other data of importance in studying stream pollution. The Scioto, Olentangy and Mahoning rivers have been made the subject of special investigation during the year, frequent chemical and bacteriological examinations of these rivers, above and below all towns of importance upon their banks, having been made. A series of stream gaugings was also carried on, to learn the minimum flow of these streams.

A special report of this investigation, which, it is believed, will be of considerable value to all persons interested in the matter of water supplies and sewerage, will soon be completed. It is the expectation of the Board to continue this work from year to year until a complete report for all streams of importance in the state can be made. Such knowledge will enable the Board to discharge in a much more satisfactory manner its important duty of approving or disapproving plans for a water supply or sewerage system, and to be of service in an advisory capacity to those towns seeking information in regard to such matters.

Prof. Orton is preparing a report on the deep ground waters of Ohio, which is to be incorporated in this special report. The great importance of a better knowledge of the underground water resources of our state will be apparent to all.

LOCAL BOARDS OF HEALTH.

We now have 2,056 local boards of health in Ohio, with a membership of over 12,000 men. The local boards, as a rule, have shown great interest in their work. Measures have been promptly taken to suppress contagious diseases, and nuisances have received proper attention. The majority of the township boards of health maintain an active organization, and perform their duties with commendable zeal. In a considerable number of townships these duties have been entirely neglected. The frequent changes in the personnel of the local boards of health is obstructive to their highest usefulness. Especially is this true of changes in the health officers, who are the executive officers of these boards. It requires time and experience to make an efficient health officer; and when a suitable man is found who is willing to serve his community in this capacity, he should not be subject to removal except for good cause.

It would be well if the law which retires two members of municipal boards of health each year were amended so as to change but one member annually, making the term of office six years instead of three. This would not only preserve intact for a longer time the membership of the board, but would give to the health officership a greater permanency.

On the whole, it may be said that the health service of the state is in good condition. Boards of health are receiving greater encouragement and better recognition; and the people are coming to regard sanitary regulations and hygienic measures as among the most vital requirements of state and local governments.

Secretary's Report.

Abstract of Proceedings of Meetings of the Board held During the Year.

JANUARY MEETING.

A regular meeting of the State Board of Health was held at the office of the Secretary in Columbus, at 8 o'clock P. M., January 20, 1897.

Present: Drs. Miller, Kahle, Stanton, Hoover and Mr. Hartzell.

Dr. Miller presided.

The minutes of the last meeting were read and approved.

The Secretary presented his quarterly report as follows:

QUARTERLY REPORT OF THE SECRETARY.

MR. PRESIDENT: Your Secretary begs leave to report as follows:

December 9th, by invitation of Dr. Rutter, manager of the Hospital for Epileptics, I visited that institution for a conference in regard to establishing sewage disposal works. At present the sewage is discharged into a run, often dry in summer, which enters the Ohio river above the city of Gallipolis. Some complaint of bad odors has been made, and a change in the method of disposing of the sewage will have to be made sooner or later.

December 16th, Dr. Hoover and I went to Chillicothe to attend a meeting of Ross county boards of health. An account of the meeting was published in the SANITARY BULLETIN for January, 1897. The board of health of Sidney proposes to hold a similar meeting at that place, and the Board is requested to assist. This plan of having a permanent organization of the boards of health of a county is, in my judgment, a most excellent one, and should be encouraged by the State Board.

January 8th, Dr. Stanton and I visited the Miami University at Oxford, at the request of its President, Dr. W. O. Thompson. They are proposing to introduce sewerage and expect to purify the sewage. Dr. Thompson expects to meet the Board at this session and present plans for approval.

January 12th I went to Toledo and looked over the plans for disposal of sewage of the Hospital for Insane. Mr. John P. Force, consulting engineer, expects to attend this meeting and present plans for approval.

The board of health of Youngstown, by resolution, requested the State Board to investigate and report upon the sewerage system of that city. Mr. Hartzell and I visited Youngstown January 15th, and inspected the system. A report has not yet been formulated.

Since the last meeting water supplies and sewerage systems for the following places have been inspected, reported upon and approved by the Board by mail vote.

Extension of sewerage system of Middletown; reported upon by Drs. Stanton and Probst.

Water supply for Shelby; reported upon by Dr. Probst.

Water supply for Hiram; reported upon by Dr. Miller.

Water supply for Chagrin Falls; reported upon by Dr. Kahle.

Extension of Crawfish Creek sewer, Cincinnati; reported upon by Dr. Stanton.

These should now be approved by *vive voce* vote.

I desire to again recommend that some action be taken in regard to testing milch cows for tuberculosis. The Bureau of Animal Industry has offered to furnish us free tuberculin sufficient to test 600 animals per week. I would suggest that a committee be appointed to arrange with some city to begin this work; the city to pay costs of making the inoculations. Warren, I consider, would be a favorable place to commence this work, as they have already provided for the inspection of dairies and dairy cows. The action of the Supreme Court of Minnesota in upholding the city of Minneapolis in requiring a tuberculin test of all cows furnishing milk to that city was noted in the last SANITARY BULLETIN.

My attention has been called to the Board's quarantine regulation in diphtheria. The rule now is:

> RULE 8. "The isolation of patients and duration of quarantine in infectious diseases shall be as follows:
>
> *Diphtheria and Membranous Croup.*—For the patient: Isolation for fourteen (14) days after recovery and disinfection of premises. For persons associated with, or in the house of the patient: Quarantine until after death or recovery of the patient and disinfection of the premises."

It has been suggested that children exposed to diphtheria in a house under quarantine should not be allowed to be at large until after the full incubation period of the disease, counting the time from last exposure. I should like to know whether the Board considers it necessary to amend this rule.

The circulars on prevention of diphtheria, and on prevention of scarlet fever have been amended, to bring them up to date, printed, and a considerable number distributed.

Notice of the rule classing membranous croup among the contagious diseases was sent to each board of health in the State.

Respectfully submitted,

(Signed) C. O. Probst,
Secretary.

On motion of Dr. Stanton the report was approved.

A report was presented by Drs. Stanton and Probst on proposed additions to the sewerage system of Middletown.

On motion of Mr. Hartzell the report and plans were approved.

A report on proposed water supply for Shelby was presented by the Secretary, who recommended its approval.

On motion of Mr. Hartzell the report and plans were approved.

Dr. Miller presented a report on proposed water supply for Hiram, recommending its approval.

On motion of Mr. Hartzell the report and plans were approved.

Dr. Kahle presented a report on proposed water supply for Chagrin Falls and recommended its approval.

On motion of Dr. Stanton the report and plans were approved.

Dr. Stanton presented a report on proposed extension of Crawfish Creek sewer in Cincinnati, recommending approval.

On motion of Mr. Hartzell the report and plans were approved.

Mr. John P. Force, civil engineer, presented plans for sewage disposal at the State Hospital for Insane at Toledo.

On motion of Dr. Stanton the plans were approved.

Mr. Force also requested approval of changes in proposed sewage disposal works for Greenville, viz.: "The modification to consist in the construction of the works in part for the present, leaving out all parts of the works shown on plans with the exception of the screen chamber and filter beds."

On motion of Dr. Kahle the modification of plans was approved.

A communication from Prof. Nelson regretting his inabilty to be present, and expressing best wishes for the members of the Board, was read.

The Secretary presented a report on an epidemic of diphtheria at Waynesfield. The report was received.

A committee of the council of Glenville presented plans for a system of sewerage, with outlet to Lake Erie.

Messrs. Holden and Williamson, of Glenville, were present and presented a petition and argument against approval of the plans.

On motion of Dr. Hoover it was voted to disapprove the plans as regards having an outlet for crude sewage into Lake Erie. The Secretary was instructed, in preparing letter of disapproval, to suggest proper methods of sewage purification.

A communication was read from Mr. Barger, director of law for the city of Columbus, inviting the Board to make an investigation of and report upon the English farm as a suitable place for sewage disposal.

Dr. Hoover, Mr. Hartzell and the Secretary were appointed as a committee to make the investigation.

Dr. Stanton moved that a committee be appointed to revise the Board's rules on transportation of dead bodies. Motion carried.

The Chair appointed the Attorney-General, Dr. Kahle and the Secretary on this committee.

A communication from the health officer of Sidney was read inviting the Board to attend a meeting of the boards of health of Shelby county to be held at Sidney.

On motion this invitation was accepted, and Drs. Kahle and Hoover were appointed to represent the Board.

A communication was presented with reference to the establishment of a permanent Census Bureau.

The Secretary was instructed to prepare suitable resolutions favoring such a bureau, and to send copies to Ohio's representatives in Congress.

The Secretary reported that certain wells in New Straitsville, which had been condemned and closed on account of bad location and which had been shown by chemical examination of the water to be polluted, had been reopened by the council of that place.

The Secretary was instructed to notify the board of health of New Straitsville that the wells should be permanently closed.

Adjourned to 9 A. M. of the following day.

No quorum was present at the time appointed for the meeting, January 21st, and at 10 A. M. that date, the members present went to the Institution for the Blind to inspect a well which the Board was called upon to approve as a source of water supply.

In the afternoon of January 21st, the Board attended a meeting of State and local boards of health, held in the city of Columbus.

(Signed) C. O. Probst,
Secretary.

APRIL MEETING.

A regular meeting of the State Board of Health was held at the Hollenden Hotel in Cleveland, April 8, 1897, at 8 o'clock, P. M.

All the members were present. Dr. Miller presided.

The minutes of the last meeting were read and approved.

Dr. Hoover and the Secretary, as a committee, reported upon the proposed additional sewerage for Galion, and exhibited a map showing line of sewer and proposed outlet. The committee stated that, in its opinion, the stream into which it was proposed to discharge the sewage was too small, in dry seasons, to dispose of the sewage without nuisance. Dr. Hackedorn, of Galion, secretary of the board of sewer commissioners, was present, and by invitation addressed the Board on the needs of sewerage in Galion.

On motion of Dr. Hoover, the plans for sewerage for Galion were referred back to the board of sewer commissioners with the request that a report be prepared showing plans for purifying the sewage.

Mr. J. P. Force, consulting engineer, presented plans for sewerage and sewage disposal at Chillicothe.

On motion of Dr. Hoover it was voted to consider these in executive session.

Dr. Crossland and the Secretary reported, as a committee, upon the plans for sewering Cambridge, and recommended that temporary approval of the proposed outlet into Will's creek be given, provided that, in the opinion of the Attorney-General (to whom the committee wished the matter referred) the State Board of Health has authority to compel Cambridge to purify its sewage in a satisfactory manner when deemed necessary by said Board.

On motion of Dr. Kahle the report was laid on the table.

Dr. Kahle made a report on additional water supply for Hiram, the supply to be obtained from springs.

On motion of Dr. Stanton it was voted to approve the proposed additional supply.

Mr. Hartzell reported upon a proposed additional water supply for Canton.

On motion of Dr. Kahle the report and proposed supply were approved.

On motion of Dr. Stanton the report of the committee on sewerage for Cambridge was taken from the table.

Dr. Kahle moved that the report be referred back to the committee with the request that the question be submitted to the Attorney-General as to the powers of the Board to compel the authorities of a municipality to purify its sewage, or to carry out an agreement to do so after a definite period, such agreement being made by the council or board of sewer commissioners of the municipality.

The motion was carried.

Dr. Hoover moved to take up for consideration the question of approving the proposed sewerage system for Chillicothe.

On motion of Mr. Hartzell it was voted to defer action until after receiving the opinion of the Attorney-General with reference to the powers of the Board.

The Secretary reported upon sewerage for Wyoming and recommended that the proposed outlet into Mill creek be disapproved unless the sewage should be first purified.

On motion of Dr. Kahle the report and recommendations were approved.

The Secretary presented the following report recommending that an investigation be commenced to show the condition of all streams in Ohio as regards quantity and quality of their waters:

MR. PRESIDENT: The work of the Board with reference to approval of public water supplies and systems of sewerage is rapidly taking first rank as regards its effect upon the public health. The information upon which the Board's approval or disapproval has been based has necessarily been of a somewhat meager character, obtained as it is by a committee which can devote only a few hours to the study of the local conditions surrounding each problem that comes before the Board.

It has seemed that there should be a permanent record of each of our streams that is or may be used as a source of public water supply, which should answer most of the questions which arise in determining its fitness for such purposes. The extent of area and character of the water-shed, the average minimum and maximum rainfall upon it, the maximum and minimum flow of the stream, the amount and character of its pollution as determined by the number of persons living on its water-shed, by ocular inspection of the various sources of pollution, supplemented by chemical and bacteriological examinations of its waters at various places, these and other points which should be known to form an intelligent opinion of the character of any stream, are matters which could be on record for the use of the Board and of all persons interested in the question of public water supplies.

A part of this information has already been obtained and may be found in the geological and meteorological reports, but most of it has yet to be gathered, and I desire to recommend that arrangements be made for a complete investigation of all streams in Ohio, beginning with the interior streams which are now being used for domestic purposes.

Work of this kind has been done in Massachusetts, New York, New Jersey, Connecticut, Wisconsin, Illinois, and I believe in other states, but so far as I know a complete report for all the streams in any one state, has not been made.

I would suggest, if it should be decided to begin work, that it be made complete for one or more streams (expecting all to be dealt with in time) rather than to make an incomplete report upon all. I would also suggest that a sanitary engineer be engaged as a consultant, and to map out the work to a large extent.

Respectfully submitted,

(Signed) C. O. PROBST,
Secretary.

On motion of Dr. Stanton it was voted to appoint a committee to prepare a plan for carrying on such investigation, said committee to be authorized to obtain the assistance of an engineer, and to report to the Board at its next meeting.

Dr. Kahle moved that a committee be appointed to draft resolutions on the death of Prof. Nelson.

The motion prevailed and the chair appointed Dr. Kahle, Mr. Hartzell and Dr. Hoover on this committee.

The Secretary reported the presence of small-pox at Toledo.

A request for approval of a sewerage system proposed for Niles was presented by the Secretary.

On motion of Dr. Kahle the matter was referred to Mr. Hartzell for investigation.

A communication was read from the health officer of Kenton, stating that no steps had been taken to improve the sanitary condition of the Hardin County Infirmary.

On motion of Dr. Hoover, Dr. Kahle and the Secretary were appointed a committee to visit the infirmary and endeavor to have necessary changes made.

A communication was read from Dr. Charles A. Smart, Secretary of the Committee of the American Public Health Association on International Arrangement for Protection against Transmission of Infectious Diseases, stating that the committee was endeavoring to secure international sanitary cooperation.

The Secretary was instructed to respond and assure the committee of the Board's desire to assist them in any way possible.

The Secretary reported that prisoners from Dayton jail, who had recently suffered from small-pox, had been sent to the penitentiary when in an unsafe condition as regards communicating contagion.

The Secretary presented a report of an investigation made to show the condition of the public water supply of Lancaster.

On motion of Dr. Kahle, the report, which condemned the supply, was approved, and the Secretary was instructed to send copies to the water works trustees and the board of health of Lancaster.

The Chair appointed Dr. Stanton, Mr. Hartzell and the Secretary a committee on investigation of streams.

There being no further business, the Board adjourned.

(Signed) C. O. PROBST,
Secretary.

SPECIAL MEETING IN MAY.

A special meeting of the State Board of Health was held at the office of the Board in Columbus, May 6, 1897, at 8 o'clock P. M.

Present Drs. Hoover, Stanton, Kahle, Crossland, Gemmill and Mr. Hartzell. Dr. Hoover presided.

The committee on investigation of streams presented a report.

The report was received.

The committee reported that the services of Mr. Allen Hazen had been secured as consulting engineer; that under his direction a drainage map of Ohio, showing boundaries of water-sheds, population on each, location of towns having a water supply or sewerage system, and other information, was being prepared.

The committee recommended that the Scioto, Olentangy and Mahoning rivers be taken up first in the contemplated investigation of streams. It reported that the following gentlemen had been consulted and had expressed a willingness to assist in the work: Professor N. W. Lord for the chemical examinations; Prof. A. M. Bleile for the bacteriological examinations, and Prof. C. N. Brown for making stream gaugings.

The committee was authorized to secure the services of the persons named in its report.

The city engineer and two members of council of Mt. Vernon presented plans for additional sewerage for that city.

On motion of Dr. Kahle a committee was appointed to visit Mt. Vernon and investigate.

Mr. John P. Force, consulting engineer, requested the Board to consider the proposal of Chillicothe to introduce sewerage, in accordance with plans presented at a previous meeting.

Mr. Hartzell moved to approve the plans, provided the authorities of Chillicothe would agree to purify all sewage in a manner satisfactory to the State Board of Health within two years from the date of first use of that part of the sewerage system which it is proposed to discharge into the Scioto river.

Dr. Crossland moved to amend by extending the period to three years.

The amendment was put and carried.

The original motion as amended was then put and carried.

Mr. Hartzell presented a report on the sewerage proposed for Niles.

On motion of Dr. Kahle the report and recommendations were approved.

Dr. Stanton reported that the authorities of Hyde Park were preparing to increase their sewerage system without the approval of the State Board of Health, and that a sewer discharging into a ravine had already been built, the outlet of which had not been approved by the Board, as required by law.

Dr. Kahle moved that this matter be referred to Dr. Stanton and the Secretary to take the necessary steps to stop the pollution at Hyde Park.

The Secretary reported that the council of Delphos was about to convert a storm water sewer into a sanitary sewer, and that the health officer of Delphos had referred the matter to the State Board of Health for investigation.

On motion of Dr. Crossland, Dr. Kahle was appointed a committee to investigate.

A request for approval of a new water supply for Gibsonburg was read.

Dr. Gemmill was appointed to make the necessary investigation.

The Chair appointed Dr. Hoover and Mr. Hartzell a committee to investigate the proposed sewerage outlet for Mt. Vernon.

The Secretary presented a report of the proposed water supply for Wauseon.

On motion of Dr. Stanton it was voted to approve the supply.

The Secretary reported that French Brothers, of Cincinnati, large dealers in milk, had offered to have their cows tested for tuberculosis provided the Board would furnish the tuberculin.

On motion of Dr. Crossland the Secretary was instructed to learn if tuberculin could be obtained free from the Bureau of Animal Industry, and to arrange for the examination.

Drs. Probst and Kahle, committee on the Hardin County Infirmary, reported that the county commissioners had agreed to introduce new plumbing throughout the infirmary, and arrange for a system of sewage disposal.

A communication was read from the president of the Lakeside Association, with reference to changes in water supply.

On motion of Dr. Hoover, the Secretary was instructed to notify the Lakeside authorities that they would be given until the June meeting of the Board to present plans for improvements.

The committee appointed to draft resolutions on the death of Professor Nelson presented a report.

The report and resolutions were adopted and the Secretary instructed to send a copy to the family.

The Secretary was authorized to purchase bottles for collecting samples of water for analysis.

The Secretary presented a report made by Dr. Baumhardt, of Lorain, on the bacteriological results obtained by the Jewell filters at that place during a two month's test, and stated that the Board was now requested to approve of the water supply of Lorain.

After some discussion it was moved by Mr. Hartzell that the Secretary be empowered to arrange for such examination of the Lorain filters as he might deem necessary to test their efficiency, and report the results to the Board as soon as possible.

The motion prevailed.

On motion of Dr. Kahle, the committee on investigation of streams was continued.

Dr. Hoover moved that the Secretary confer with Dr. Orton and arrange, if possible, for a report from him on the underground water supplies of Ohio.

The motion was carried.

There being no further business the Board adjourned.

(Signed) C. O. PROBST,
Secretary.

JUNE MEETING.

A regular meeting of the State Board of Health was held at the Hollenden Hotel, Cleveland, June 23, 1897, at 8 o'clock P. M.

Present: Drs. Miller, Stanton, Kahle, Crossland, Gemmill and Mr. Hartzell. Dr. Miller presided.

The minutes of the April meeting and of a special meeting held May 6, 1897, were read and approved.

The Secretary reported that further complaint had been made of the pollution of Crawfish Creek by the sewage of Hyde Park.

On motion of Dr. Stanton the Secretary was instructed to refer the matter to the Attorney-General, and ask for instructions as to the steps that could be taken by the State Board of Health to have the nuisance abated.

The Secretary presented his quarterly report, which, on motion of Dr. Stanton was received and ordered filed.

The report was as follows :

QUARTERLY REPORT OF THE SECRETARY.

MR. PRESIDENT : Your Secretary begs leave to report as follows :

On May 7th I went to Massillon with the board of trustees of the State Hospital for Insane. It is proposed to obtain water for domestic purposes from a bored well 267 feet deep, located near the power house and some distance from occupied buildings. I found that some of the workmen there complained that the water did not agree with them, and were drinking water from another source. Others used it without complaint. A sample of the water was sent to Professor N. W. Lord, who reported as follows :

Results in parts in 100,000

Oxygen required	.09
Free Ammonia	.0391
Albuminoid Ammonia	.0023
Nitrous Acid	None
Nitric Acid	.05
Chlorine	.33
Total Solids	30.5
Volatile Solids	4.
Hardness by soap	14.
Alkalinity as carbonate of lime	25.1

The following determinations were also made upon the Massillon sample.

Parts in 100,000

Lime (as oxides)	9.26	
Magnesia (as oxides)	4.42	
Sulphuric acid (SO_3)	1.49	
Probably combined as Calcium carbonates		14,67
Magnesium carbonates		9.28
Calcium sulphates		2.53
Total solids by evaporation, 26.5		26.48

The Massillon water is high in free ammonia but low in chlorine and all other undesirable materials. It has the characters of a deep well water and as such is of first rate quality.

The percentages of magnesia and lime are not above those often found in good waters."

Very respectfully,
(Signed) N. W. LORD.

The water seems to be free from organic pollution, but I would recommend that further investigation be made of its effect upon those using it before approving the supply for hospital purposes.

The question of sewage disposal was looked into. In front of the institution, between the hill on which the buildings are located and the main road, there is sufficient land, admirably suited for filtration of sewage. Sewage fields in this location would somewhat mar the beauties of the landscape, besides being in the wrong place as regards the direction of prevailing winds. In the rear of the buildings, near where the kitchen gardens will be placed, is land excellently located and of good quality for sewage disposal by filtration. I advised the trustees to acquire this land for that purpose.

On June 3d, I went to Sabina, by request of the waterworks trustees. They desired to locate wells for a public water supply and had secured option on several pieces of land. All of these were within the corporation, near habitations, and of small area. I recommended that the wells be located outside the village and that they be placed near the center of not less than two acres owned by the village, so as to prevent encroachment of dwellings or other sources of pollution.

The work of investigation of streams is progressing. The drainage map of Ohio is about completed as regards data at hand. It will be added to from time to time as information is obtained. The preliminary survey has been made of the Scioto, Olentangy and Mahoning rivers, by Dr. Bleile and myself. In selecting places for taking samples of the river water for examination I had in mind the following points:

First—To go above a city contributing sewage to the stream so as to show the condition of the river as it reaches that city.

Second—To go far enough below such a city to insure a thorough mixing of the sewage and water, and thereobtain a sample showing the amount of pollution chargeable to such city

In addition sites were selected with reference to favorable places for stream gaugings, which are to be made hereafter. In all cases samples were taken from running water, and care was taken to have these fairly represent the quality of the stream at these places. Dr. Bleile carried a field outfit and plated his cultures on the spot.

He has agreed to collect the samples for chemical examination, and these are taken at the same places where the bacteriological examinations are made.

In nearly all places we visited it was necessary to drive several miles to collect samples above and below sewage pollution. In such places, to save time, I have arranged with liverymen to meet Dr. Bleile on arrival of his train. In addition to the chemical and bacteriological examinations, arrangements have been made for a quantative oxygen test, which will be made by Dr. Bleile on the spot. This will be a valuable aid in determining the amount of pollution at the different places.

Two samples were collected at Kenton, two at Delaware, two at Marion, five at Columbus, two at Circleville, and one at Chillicothe.

On the Mahoning two samples were taken at Youngstown, one at Girard, three at Warren and four at Alliance.

At Columbus one sample was taken about one-half mile below the lowest sewer, one from the Scioto just before it is joined by the Olentangy, one from the Olentangy just before it joins the Scioto, one at Jones' dam and one at Fishinger's dam on the Scioto. The latter represent two sources of water supply which have been proposed for the city of Columbus.

At Warren they are using the Warren filter to purify the water supply. This is a mechanical filter something like the Jewell. A sample of the filtered water was taken.

At Alliance they have a plant for purification of sewage by chemical precipitation. A sample of the sewage, and of the sewage effluent was therefore taken.

The work at Lorain is under way, as you will witness, I trust, to-morrow. Mr. F. S. Hollis, of Boston, has been engaged for the bacteriological work. An assistant was necessary. and Mr. Flynn, a second year man in the engineering course at the Ohio State University, was engaged. Arrangements were made to receive daily reports from Mr. Hollis, Dr. Baumhardt, who is working for the city, and from Mr. Brown, who is engaged by the filter company. So far, for reasons which will no doubt be satisfactorily explained, only two reports have been received. These were from Dr. Baumhardt.

On June 9th, I attended a meeting in Cleveland, called for the purpose of securing, if possible, satisfactory rules governing the shipment of dead bodies, uniform for the United States and Canada. The meeting was called by a committee of the National Baggage Agents. The Michigan Central; Fitchburg; Chicago, Burlington & Quincy; Atchison, Topeka and Sante Fe; Lehigh Valley and Grand Trunk railroads were represented. The National Funeral Directors Association was represented by the president and treasurer from Ohio, and members from Iowa, Virginia, Pennsylvania and Indiana. The secretaries of the Indiana, Illinois, Michigan and Ontario boards of health were present. I was officially appointed to represent the American Public Health

Association. I have here a stenographical report of the proceedings which you will scarcely care to hear in full. The meeting finally adopted rules, and left them in the hands of a committee for such changes as the committee might deem necessary. This committee consists of Mr. Dearing, of the Michigan Central Railroad, Dr. Hurty, of the Indiana Board, and myself; we meet in Indianapolis next Friday.

Respectfully submitted,

(Signed) C. O. PROBST,
Secretary.

Plans for a system of sewerage and sewage disposal for the village of Glenville were presented for approval by Mr. John P. Force, consulting engineer, and two members of the Board of Sewer Commissioners of Glenville. The matter was referred to executive session.

Mr. Oram, president of the Lakeside Association, appeared before the Board and made a verbal statement of changes in the water supply proposed for that place. Mr. Oram was requested to furnish plans, with a description in writing of a filter which it was proposed to use.

Dr. Kahle made a verbal report of proposed additions to the sewerage system of Bucyrus, and recommended that the plans be disapproved.

On motion of Dr. Stanton the report and recommendation were approved.

On motion of Dr. Kahle it was voted to approve the plans as presented for a system of sewerage and sewage disposal for the village of Glenville.

Invitations from the board of health, board of trade and chamber of commerce of Lorain, inviting the Board to visit that city and inspect their water filtration plant, were read.

It was voted to accept the invitation and start for Lorain at 8:40 A. M. the following day.

The election of officers being taken up, Dr. Thomas C. Hoover and Dr. R. D. Kahle were unanimously elected President and Vice-president, respectively, for the year ending the third Wednesday in October, 1898.

On motion of Dr. Gemmill, the President-elect and Secretary were appointed delegates to the meeting of the American Public Health Association, to be held in Philadelphia in October, 1897.

On motion of Dr. Kahle it was voted to send two delegates to the meeting of the National Conference of State Boards of Health, to be held in Nashville in August, 1897. The president appointed as delegates, Dr. Kahle and the Secretary.

On motion of Dr. Stanton the President was delegated to attend the Section of State Medicine of the British Medical Association, to be held in Montreal in August, 1897.

The question of approving a system of sewerage for the city of Cambridge, reported upon at a previous meeting, was taken up for consideration.

On motion of Dr. Kahle it was voted to approve the outlet of the twenty-four inch main sewer, shown in the plan submitted by the engineer, provided that arrangements he made to purify the sewage in a manner satisfactory to the State Board of Health within a period of three years, counting from the time said sewer outlet is completed ready for use.

Dr. Gemmill presented a report on the proposed water supply for Gibsonburg, and recommended that the supply be approved.

On motion it was voted to adopt the report and approve the supply.

Dr. Kahle presented a report on a proposed change in the sewerage system of Delphos; viz.: to make use of a storm water sewer discharging into Jennings Creek, for the purpose of carrying sewage. Dr. Kahle recommended that the proposed change be approved "until such time as the State Board of Health shall deem it wise to require purification of the sewage."

On motion the report and recommendations were approved.

Messrs. Hoover and Hartzell presented a report on the proposed extension of the sewerage system of Mt. Vernon, and recommended that the plans, presented by the engineer, be approved subject to the condition that "the approval carries with it the right of the State Board of Health to suppress the use of said sewage exit at such time as the same becomes a menace to the health of other residents and owners of the Kokosing waters."

On motion the report and recommendations were approved.

The plans for disposing of the sewage of Shepardson College at Granville, previously reported upon, were on motion, approved.

On motion of Dr. Kahle a recess was then taken.

On the following day the Board visited Lorain and inspected the plant for filtering the public water supply.

The Board reconvened at 3 P. M. the same day.

On motion of Dr. Stanton a vote of thanks was extended to the board of health, board of trade and chamber of commerce of Lorain, for courtesies extended while in the city.

It was voted to add the Secretary to the delegation appointed to attend the meeting of the British Medical Association to be held in Montreal.

No further business presenting the Board adjourned.

Respectfully submitted,

(Signed) C. O. PROBST,

Secretary.

OCTOBER MEETING.

A regular meeting of the State Board of Health was held at the Secretary's office in Columbus, October 20 and 21, 1897.

Present: Drs. Miller, Hoover, Stanton, Kahle and Crossland.

The meeting was called to order by the President, Dr. Miller, at 8 o'clock P. M.

The minutes of the last meeting were read and approved.

The Secretary presented his quarterly report, which was as follows:

QUARTERLY REPORT OF THE SECRETARY.

MR. PRESIDENT: Your Secretary begs leave to report as follows:

The river examination is being continued in accordance with the plan approved by the Board. In addition to the chemical and bacteriological reports, copies of which have been sent to you, reports of the gaugings of the river have been made by Prof. Brown.

It is the expectation that examinations will be made for October and November and then close.

These reports are tentative, and the data will be carefully worked up for the final report.

Dr. Orton is now at work preparing a report on the underground water supplies of the state.

Mr. Hazen has made a preliminary report upon the data being prepared for the final report, most of which will be displayed upon the map which will go with the report.

In this connection I wish to read some letters which bring forward a question relating to this special river examination:

NEWTON FALLS, OHIO, September 13, 1897.

C. O. PROBST, M. D., Secretary, Columbus, Ohio:

MY DEAR SIR: The trustees of Newton township have drained with a tile drain a graveyard or cemetery into Duck creek. Said cemetery is about 100 feet from said creek and naturally has no way of drainage into the creek only by percolating through rock and soil. This tile drain is laid all through the cemetery and has its open outlet into the creek. Objection is made to it by property owners along the creek because they believe it contaminates the water. I write to know what can be done in the matter. Can they be made to take up the tile and abate the nuisance or must the people submit? The water from the creek empties into the Mahoning river about three miles above Warren, Ohio. Does it injure the water for the city?

Yours truly,

(Signed) H. M. REESER, H. O.

NEWTON FALLS, OHIO, September 28, 1897.

C. O. PROBST:

DEAR SIR: At the request of the township trustees I write you in regard to the matter of underdraining the cemetery into Duck creek, in regard to which complaint has been made to you. Last March, a petition, signed by twenty-eight land owners, living near this cemetery, was presented to the township trustees, most of the signers of which live below this cemetery and own land through which this creek flows. They then asked the township trustees in said petition to underdrain this cemetery, which the trustees proceeded to do, substantially as petitioned for. At least nineteen of the twenty-eight signers live below and own land through which this creek flows. The soil in that locality is a hard blue clay, and the drains are down six feet below the surface, which will alone convince you that this stream has not, nor will it be, polluted by reason of them. The fact of the matter is that so far as draining this cemetery is concerned, they are a failure. No one will say to you that they have seen at any time any water coming from them. They are conceded to be a failure by almost every one in that locality. Now while the trustees will not be the cause of the pollution of this or any other stream, they do not feel as though they ought to go to the extra expense now of taking them up. An expense which will be useless for reasons stated, viz., no water passes through them and they do no harm whatever where they are. Furthermore, this cemetery is located at least ten miles from Warren and the water in this stream (when there is any) will travel at least eleven to twelve miles before it reaches Warren. If polluted at all, would it not be purified in traveling that distance? We are inclined to think that the whole matter is "a tempest in a teapot," and ask you to consider the matter from our standpoint as well as from that of others. We believe that some one is more scared than hurt. If it is found that this stream is polluted by these drains so that life or health is endangered thereby, we are ready to remove them, but we contend that it is not.

(Signed) D. M. BAILEY,
Township Clerk.

WARREN, OHIO, October 12, 1897.

C. O. PROBST, M. D., Secretary State Board of Health, Columbus, Ohio:

DEAR SIR: At a recent visit by members of this Board to the Trumbull County Infirmary, located about two and one-half miles north of our city, it was learned that all the drainage from the closets,, bath rooms, laundries, etc., is emptied into a small stream called "Young's Run," which runs through the infirmary farm; emptying into the Mahoning river, not over three miles, by its course, from the Warren water supply.

The Board has had one conference with the County Commissioners on the subject, at which they expressed a willingness to do what may be deemed necessary to prevent this contamination, as soon as the proper method can be brought about or suggested to them.

The feeling of this Board is that it is a matter that should have immediate attention, and for that reason we shall be pleased to receive any suggestions that you may have to offer on the subject.

The "Young's Run" is the natural drainage of the farms through that part of the country, and no other drainage can be secured for the infirmary. We shall be pleased to hear from you with any suggestions you may have at an early date.

Very truly yours,
(Signed) EDWIN O. IZANT,
Clerk.

There is a similar question as regards the pollution of Columbus' water supply. A portion of this supply is taken from the Scioto river, and for several weeks, recently, all of this stream has been taken into the mains. Not more than eighteen miles above where the water is taken from the river the sewage from the Girls' Industrial Home discharges into it. This institution contains about 400 people. On October 7th I visited this institution, in company with Dr. Bleile, and samples of the river water were taken for examination above and below where the sewage empties into the river.

This is introductory to a recommendation I wish to make. That is that a special and minute examination should be made of all sources of pollution dangerously near to cities obtaining water supplies from rivers under consideration. These would be Columbus, on the Scioto, and Alliance, Warren and Youngstown on the Mahoning.

It will be remembered that the Board was asked to approve a change in the water supply of Lakeside, this change to consist of abandonment of all wells upon the grounds, and the substitution of water from Lake Erie, to be filtered by a sand and gravel filter ten feet in diameter, or by a Squire filter. It was the sense of the Board that neither of these filters could be approved, and that under the circumstances the Board could only condemn the use of wells or of unfiltered water from Lake Erie, suspending judgment until a trial was made of any system of filtration introduced. From letters which I beg leave to present, it will be seen that the wells at Lakeside were again used for drinking water, resulting in the production of several cases of typhoid fever. That there were other cases of which we have no knowledge is extremely probable.

I would recommend that arrangements be made for the usual joint meeting of State and local Boards of Health, following the January meeting of this Board.

I wish also to recommend that a complete set of county atlases be purchased for the office of the Board. In studying questions of sewerage and water supplies they would be of the greatest value. These atlases contain maps of the cities and villages in each county, showing all streams which may pass through such cities or villages. I am unable to report what would be the cost of a complete set, and am not sure that we would be able to find an atlas for each county. I am having inquiries made in regard to this.

Respectfully submitted,

(Signed) C. O. Probst,
Secretary.

Mr. Mansfield, a member of the Board of Sewer Commissioners, and Mr. Weddell, Engineer, presented plans for a system of sewerage and sewage purification for the village of Shelby.

The matter was referred to executive session.

Dr. H. C. Rutter, Manager of the Hospital for Epileptics, appeared before the Board with an outline of plans for the purification of the sewage from the cottage for insane, under construction at that institution.

The matter was referred to executive session.

Mr. W. E. Myers, C. E., of Kenton, presented plans for the purification of sewage from the Hardin County Infirmary.

Referred to executive session.

A communication was read from Prof. Albert A. Wright, of Oberlin, Ohio, stating that an effort would be made to secure a topographical survey of Ohio.

The following resolution was adopted :

WHEREAS, In the investigation of the surface water supplies of Ohio—their quantity and quality—now being conducted by the State Board of Health, the lack of reliable information concerning the topography of the State has been constantly brought to our attention and

WHEREAS, A topographical map of the State of Ohio would be of the greatest service to us, and of daily use,

Resolved, That our assistance be given to such efforts as may be made for obtaining from the National and State Governments a complete topographical survey of the State.

An application for approval of a water supply for the village of Caldwell was read.

On motion of Dr. Miller the matter was referred to Dr. Crossland for investigation.

Adjourned to the following day.

SECOND SESSION.

The Board reassembled at 9 A. M. Wednesday October 21, 1897.

Present : Drs. Hoover Stanton, Kahle and Crossland.

Dr. Hoover, elected President at the preceding meeting, took the chair.

He suggested that a uniform plan, so far as possible, should be followed in reporting upon investigations of proposed systems of water supplies and sewerage.

On motion of Dr. Stanton, the President and Secretary were appointed a committee to prepare a blank form to be used in such investigations.

On motion of Dr. Stanton, Mr. Hartzell was delegated to attend the meeting of the American Public Health Association, to be held in October, 1897.

On motion of Dr. Kahle it was voted to approve the outlet of the proposed sewerage system for Shelby, the straightening of the channel of the creek, and the plans for purification of the sewage, provided that the sewage filtration beds be constructed in a manner satisfactory to the State Board of Health.

On motion of Dr. Stanton, the Secretary was instructed to request Dr. Rutter to furnish plans and specifications of the sewage purification beds which he proposed to introduce at the Ohio Hospital for Epileptics.

On motion of Dr. Kahle the plans for purifying the sewage of the Hardin County Infirmary were approved.

On motion of Dr. Stanton it was voted to approve the plans for filtering the public water supply of Lorain, subject to the condition named in the letter of approval, authorized by the Board.

On motion of Dr. Stanton it was voted to approve a change in the sewerage system of Delphos, as reported upon by Dr. Kahle, subject to the conditions named in the letter of approval authorized by the Board.

On motion of Dr. Crossland it was voted to approve plans for the extension of the Torrence Road sewer in Cincinnati, as reported upon by Dr. Stanton, subject to the conditions named in the letter of approval authorized by the Board.

On motion of Dr. Kahle it was voted to disapprove the source of a public water supply proposed for Sabina, as reported upon by the Secretary.

On motion of Dr. Crossland it was voted to approve the source of a public water supply for West Alexandria, reported upon by Dr. Stanton.

On motion of Dr. Stanton it was voted to disapprove the sewerage system proposed for Bluffton, as reported upon by Dr. Kahle.

On motion of Dr. Stanton it was voted to approve plans for a public water supply for Monroeville, as reported upon by the Secretary, subject to the conditions named in the letter of approval authorized by the Board.

On motion of Dr. Stanton it was voted to approve plans for additional sewerage for Zanesville, as reported upon by Drs. Crossland and Probst.

Drs. Hoover and Probst presented a report recommending the approval of a public water supply for Sabina, to be obtained from wells differently located from those condemned in a former report.

On motion of Dr. Kahle the report and recommendations were approved.

Mr. Hartzell and the Secretary presented a report of an investigation of the water supply of Wooster, showing that Wooster was making use of an additional water supply which had not been approved by the Board.

The report was approved, and the Secretary was instructed to send a copy to the board of water-works trustees of Wooster, and notify them that further use of water from Apple Creek was disapproved.

The Secretary reported upon cases of typhoid fever apparently traceable to the use of water from wells at Lakeside.

On motion of Dr. Kahle, the Secretary was instructed to write a report of the cases of typhoid fever traceable to Lakeside, send it to the local board of health, and instruct them to order all wells at Lakeside closed.

The Secretary presented communications from the township board of health of Newton Falls in regard to the drainage from a cemetery at that place.

The Secretary was instructed to say that time would be granted for the demonstration of the amount and character of drainage contributed by the cemetery in wet weather.

Communications were read in reference to the sewage from the Trumbull County Infirmary being a possible source of pollution of the public water supply of Warren.

The Secretary was instructed to communicate with the Commissioners of Trumbull county in regard to employing means for the purification of the sewage of the Infirmary.

Dr. Stanton moved, and it was voted, to instruct the Secretary to call the attention of the board of health of Warren to the fact that bacteriological examinations made by the State Board of Health showed that the public water supply of Warren was not being efficiently purified by filtration.

The President and Secretary were appointed to prepare a program for a joint meeting of the State and local Board of Health to be held in Columbus, January 20, and 21, 1898.

The President appointed Drs. Kahle, Crossland and Stanton members of the Finance committee.

The Secretary presented the annual report for the year ending October 31, 1897.

On motion of Dr. Kahle the report was approved.

There being no further business the Board adjourned.

(Signed) C. O. PROBST,
Secretary.

MEMORIAL UPON THE DEATH OF PROFESSOR EDWARD T. NELSON.

(Adopted by the Ohio State Board of Health.)

Prof. E. T. Nelson ; a member of the Ohio State Board of Health, died February 28, 1897, at the age of 52 years.

He had served one full term on this Board, and had only recently entered upon his second term.

At this regular meeting of the Board, held in Columbus May 6, 1897, Prof. Nelson's colleagues deem it due to place on record this tribute to his memory.

The equipment of Prof. Nelson for usefulness in the field of preventive medicine was extraordinary. His scholarship was comprehensive and profound. We can well understand why he achieved an enviable reputation as an instructor. Honesty, and thoroughness in detail, characterized his work. His labors ever had a close alliance to philanthropic endeavor. By travel, by study, by occupation and by inclination had he so profited as to be able to render to this Board services of very great value.

Professor Nelson was an amiable and upright man. He was a most genial and honorable gentleman. We shall feel the loss of his companionship.

Professor Nelson's colleagues on this Board wish to assure his widow and surviving family of their profound sympathy. Their bereavement is great—it is beyond the power of words. His memory and example remain. Let us cherish the one and imitate the other.

Contagious Diseases.

SMALL-POX AT DAYTON.

A case of small-pox developed in the jail at Dayton on February 1, 1897. The patient, Charles Stimmel, had been in continuous confinement for forty-seven days and the origin of the disease was not learned. The patient was taken to the infectious disease hospital.

On February 14th, Charles Taylor and Pearl Corns, two other prisoners in the jail, developed small-pox. They were also removed to the hospital, and no other cases occurred.

Much excitement was created in Columbus on March 4th by a report that a prisoner received at the Ohio State Penitentiary the night before had small-pox. The Secretary, Dr. Probst, visited the Penitentiary on the morning of March 4th, and in company with Drs. Wagenhals and Tharp, examined the prisoner. He reported that, in his opinion, the man was still liable to communicate small-pox. Vaccination, isolation of exposed persons, and disinfection were rigidly enforced, and there was no development of the disease.

The prison physicians made the following affidavit:

"I made a personal examination on the eve of March 3d, of Charles Taylor who was admitted to the Ohio Penitentiary on that day. After he had passed through the various departments, including bath, he was taken to the hospital where a descriptive and physical examination is made of all prisoners. It was there discovered that he was infected with small-pox; the body was covered with light colored spots which were moist to the touch, a condition produced by the recent removals of the crusts from the body by bathing. Many crusts still remained on the body and face. Upon examination the following morning, in company with Drs. Probst, Tharp and Steuer, we found a number of crusts had become detached, adhered to the clothing and upon removal of the clothing fell to the floor.

These facts are conclusive that the disease was in that stage which is recognized as communicable by contagion and infection.

(Signed) F. S. Wagenhals, M. D.,
Physician.

We were present at the above examinations and concur in the statements made therein.

(Signed) G. A. Tharp, M. D., Assistant Physician.
(Signed) J. C. Steuer, M. D., Assistant Physician.

STATE OF OHIO, } ss.
FRANKLIN COUNTY. }

On this 12th day of March, A. D. 1897, appeared before me, a Notary Public within and for the county of Franklin and State of Ohio, Doctors F. S. Wagenhals, G. A. Tharp and J. C. Steuer, who, after being by me sworn, signed the above statement in my presence and declared the above statement to be true.

(Signed) FRANK KOEHNE,
Notary Public.

Following is a report of this matter as made by the health officer of Dayton to the board of health of that city:

To the Board of Health:

GENTLEMEN: After a careful investigation I am unable to account for the development of small-pox in the Montgomery county jail.

On February 1, 1897, varioloid developed in the person of Charles Stimmel, who had been in continuous confinement for forty-seven days. The attending physician, Dr. J. S. Beck, diagnosed and reported the case upon the above date and the patient was at once transferred to the quarantine hospital. The prison was quarantined, the bedding burned, the cells washed with a solution of bi-chloride of mercury and the rooms fumigated for four hours by the fumes of burning sulphur. Under the careful supervision of Dr. Beck the prisoners were repeatedly vaccinated during the two weeks following the development of the disease.

On February 14, 1897, the disease developed in the persons of Charles Taylor and Pearl Corns, who were sent at once to the hospital, and the following day John Stephens also developed symptoms of the disease and was likewise sent to the hospital.

The bedding, clothing, cells and cell rooms were disinfected as upon the diagnosis of the first case and a rigid quarantine of the prison continued. On March 2, 1897, sixteen days after the removal of the last case from the jail, as there was found to be no further development of the disease, the quarantine was removed and the prison opened to general business.

As the result of the efficient vaccination of the prisoners by Dr. Beck, the disease was so much modified in the patients last named that the premonitory symptoms were so slight that the disease was not recognized until the eruption appeared.

The eruptions were so slight in each case and the disease so nearly overcome that I found upon personal inspection at the end of the fifth day that the vesicles showed no disposition to pustulate and at that time all vesicles were rapidly drying up and crumbling without forming a solid crust. The eruption in the Stimmel case was now fully developed, but even in his case upon the twentieth day the crusts had almost entirely disappeared. The cases in the hospital were treated by Dr. V. M. Bailey, the regular attending physician who has entire control of all public cases of small-pox inside as well as outside of the hospital.

As usual, Dr. Bailey reported to me daily and informed me on Saturday, February 27, that the eruptions had entirely disappeared, and the crusts fallen off and the patients could be safely removed on Monday, March 1st. I then notified Mr. C. M. Anderson, the sheriff of Montgomery county, that the prisoners had recovered and would be held after March 1st. subject to his order. On Saturday, February 27th, patients bathed and properly prepared for final discharge on the following Thursday. On Tuesday, Stimmel, Corns and Stephans were again bathed, furnished with clean and uncontaminated clothing by the sheriff and at once removed from the hospital in the usual way.

Inasmuch as Charles Taylor had been sentenced to the penitentiary, he was not removed until the following day, when he was dismissed in the same manner as the others. Taylor is an invalid, suffering from epilepsy, and from an inspection made by Dr. Beck and myself two weeks before he was attacked by varioloid, he had a very slight eruption on the face and other parts of the body, resembling acne, which was thought might be the result of the use of bromide of potash, which is a remedy used in the treatment of epilepsy. The patients were all dismissed, fully recovered and entirely free from contagion.

Respectfully submitted,
(Signed) A. H. Iddings, M. D.,
Health Officer.

Fortunately there was no spread of small-pox, but the danger was very great, and there should be means to prevent such occurrences. When a jail prisoner has been sentenced to the penitentiary, the county officials are most anxious to be relieved of him. A heavy penalty should be provided for bringing to the penitentiary any prisoner suffering from, or in a condition to communicate, a dangerous contagious disease.

SMALL-POX AT IRONTON.

To the State Board of Health:

Gentlemen: November 8th and 9th telegrams were received from the health officer of Ironton urging me to come there on account of suspected small-pox. I went on the 9th.

I found Henry Curtner, a laborer, sick, with the following history:

He had been working on the streets, was taken sick Thursday, November 5th, with severe headache and backache (small of back), high fever and delirium. Eruption appeared Saturday night about the face, scalp, and on the wrists, papular Sunday, vesicular Monday. I saw him Tuesday at 8:30 A. M. Headache and backache about gone, little or no fever; eruption vesicular on face, scalp and wrists, some becoming pustular; body covered, most plentiful on back; papular on lower extremities. Eruption on hard palate; hoarseness and sore throat. Diagnosis—small-pox. The patient was vaccinated in Cincinnati, in the spring of 1895. There were two scars, smooth, not foveolated. There were five in the family; wife, daughter, her baby seven weeks old, and a young man. All had been vaccinated years ago except the baby. All were again vaccinated by the health officer and myself. The house of the patient was formerly a saloon, and is within six feet of the Scioto Valley Railroad track. There is a family named Long, consisting of three adults, two grown children and four young children, living upstairs in this building. An old man in this family found an old coat under the river bank, early in October. Nothing was known about the coat, though it was rumored to have come from the pest house. Two or three weeks later a young child in the family was taken sick, with high fever, followed by eruption. The mother said, "first little pimples appeared, which turned to blisters, and then got matter in them." Dr. Lowry, the health officer, saw the child October 26th. It was covered with a vesicular eruption. Did not pay particular attention to it; thought it would die, and did not see it again. When seen November 10th, there were faint pock marks over the face and body; not deep, and looked like scars from chicken-pox. On the back were two scabs; one thick and as large as a little finger nail, the other cup shaped, central depression. Three unvaccinated children in this family were well, and the patient had never been vaccinated. Diagnosis small-pox (?). The house was being guarded, but two of the Curtner family were out on Monday, the 9th. There were several visitors at the house of this family, Saturday and Sunday, the 7th and 8th. I met the board of health at 11 A. M., arranged for vaccinating the Long family, and for vaccination and quarantine of exposed persons. I advised that Curtner and the Long baby be taken to the Infectious Disease Hospital, with nurses, and be kept separated so as not to expose the baby to Curtner. The house was to be disinfected by the health officer, and both families quarantined for 14 days from completion of disinfection. There has been considerable wrangling between the board of health and council of Ironton, over the expenses of the board; and by request I visited the president of council and urged that an appropriation be made at once to provide for the emergency. November 14th the health officer wrote that council met on the 10th and appropriated $500. They also appointed three physicians to examine the case. These physicians reported November 13th, that the patient was "suffering with a modified case of small-pox (varioloid)." No other cases have been reported.

Respectfully,

C. O. PROBST,
Secretary.

SMALL-POX AT TOLEDO.

Under date of April 3, 1897, Dr. J. T. Woods, health officer of Toledo, reported a case of small-pox in that city. The patient, George Miller, age 24, was engaged in driving a delivery wagon, and many persons were exposed by coming in contact with him.

The patient had not been out of the city, and the manner of his exposure to the disease could not be learned. He was removed to the hospital for infectious diseases April 2, and all exposed persons, so far as they could be found, were vaccinated.

A report having been started by a physician (who was permitted to see this case at the hospital) that the disease was not small-pox, the secretary, Dr. Probst, was summoned to Toledo to see the case. He reported the case to be unmistakably small-pox.

Under date of April 20th, two more cases were reported. One, a young man who had been exposed to the first case, and had never been vaccinated until after exposure, vaccination failing to "take," however. He was sent to the hospital. The other case was a young woman, living in the Polish quarters. She refused to be taken to the hospital and was quarantined in her own home.

The health officer at this time expressed fears that an epidemic would prevail. May 3d a brother of this patient was taken down.

May 10th another case was discovered in the Polish quarters, the patient having been ill since May 1st.

May 13th a child was discovered with small-pox, the eruption having appeared. May 3d the mother was unvaccinated. The entire family, father, mother and child, was removed to the hospital.

The most vigorous measures were taken by the health department of Toledo to limit the spread of the disease. All but two of the patients were removed to the hospital. Vaccination was carried out in the infected quarters. Through these efforts, and in spite of the fact that the disease got a firm foothold in a bad quarter to deal with, there were but eighteen cases and three deaths.

The health department of Toledo is entitled to much credit for having prevented an epidemic of the disease.

DIPHTHERIA AT DELHI.

To the Ohio State Board of Health.

GENTLEMEN: The board of health of Delhi having passed a resolution requesting the State Board of Health to send a representative to make an investigation in regard to the prevalence of diphtheria at that place, I went there by appointment of the president and would present the following report:

There have been differences of opinion among the physicians as to the character of the disease that has been very prevalent in the town and adjoining corporations. The cases of sore throat were so numerous as to suggest contagiousness, while many of the cases were of so mild a character that some of the physicians did not believe the disease to be diphtheria. There were no cases either of the mild form of the disease or the more severe form in the town at the time of my visit, I was therefore unable to assist the health officer in making a diagnosis, but from the clinical history obtained from that officer and from members of the board of health, I am of the opinion that some of the cases were diphtheritic in character, while the mildness and short duration of many other cases lead me to believe that a majority of them were cases of simple follicular pharyngitis.

In view of a possibility of a recurrence of the disease either in mild or severe form, I would suggest that the local board be advised that in the opinion of the State Board of Health all cases of a doubtful character, and all cases reported by the attending physician as diphtheria, be quarantined for the usual length of time, or until it is clearly shown that it is not contagious, thus placing the responsibility upon the person making the report. I would further suggest that the local board of health be requested, should any more doubtful cases occur, to have bacteriological examinations of the exudation and secretions made, as in this way only can positive diagnosis be made.

Respectfully submitted,

BYRON STANTON, Committee

DIPHTHERIA IN THE ORPHANS' HOME AT FINDLAY.

To the Ohio State Board of Health,

GENTLEMEN: November 27th, at the request of the mayor and health officer, I went to Findlay. Diptheria had been prevailing in their Orphans' Home since last May, and I was requested to make an investigation of its sanitary condition. I visited the Home with Dr. J. P. Baker, the attending physician, and Mr. Amos Beardsley, the health officer. The first case appeared in the Home May 5th. This case was traceable to exposure to a family in the neighborhood having diphtheria. There were four cases from May 6th to 11th, then a break of twenty days, and then seven cases from May 31st to June 6th. There was one case July 5th, one July 22d, one August 25th, one August 28th, and one September 2d. The disease seemed then to disappear. The Home was thoroughly disinfected and cleaned, and quarantine raised. On November 22d three new cases occurred, then one on the 23d, and one on the 25th. The sewage from the Home is discharged into a ditch near at hand. The health officer before my visit had found this sewer partly obstructed and in a filthy condition. A cistern under the kitchen had an untrapped overflow to the sewer, and the sewage had flowed back to this cistern. Two rain leaders discharging into the sewer were also untrapped. These defects had been removed before my inspection. Near the cistern, formerly under the back porch but now under a room in a new addition, is the well. This is a deep drilled well in rock, with iron casing, but is within six feet of a stone pipe sewer and is, in my judgment, liable to pollution.

The worst feature is the heating and ventilation. The home was built for a sanitarium, but is well calculated in its heating and ventilation arrangements, to keep people sick. There are two hot air furnaces in the basement. These have no fresh air ducts, but take air directly from the basement. All or nearly all of the bed rooms, living rooms and halls have two openings, one for foul air and one for fresh (?) air. The foul air opening connects with a pipe leading to the furnace, where it becomes a fresh (?) air pipe. In other words it was the intention to form a continuous circuit for the air from the furnace to the rooms, back to the furnace and on again to the rooms. It is probable that these foul air ducts were seldom working, but a better plan for disseminating a contagious disease can hardly be imagined. Aside from this the Home was clean and in good condition. Every possible avenue for the reintroduction of diphtheria into the Home was inquired into as closely as possible, but nothing could be learned to indicate reinfection. The attending physician was extremely careful as regards disinfection. He was, however, using some patent disinfectant whose germicidal efficiency is unknown. At my suggestion boiling water and bicloride solution were substituted. Of the twenty-one cases all but three or four had been treated with antitoxin. There were no deaths, and Dr. Baker was confident the treatment had saved several lives. By request I called upon the President of the Home, Mrs. Jones. I recommended closing all foul air ducts and providing fresh air pipes for the furnaces. This as a temporary expedient, but a new system of heating and ventilation as soon as possible. Also the abandonment of the well and cistern, and providing a new well. She promised to have these changes made at once. I also suggested that all second-hand clothing sent into the Home be disinfected on receipt. This was agreed to.

Respectfully,

C. O. Probst,
Secretary.

DIPHTHERIA AT GREENFIELD.

To the State Board of Health:

Gentlemen: November 18th I was called to Greenfield by the board of health of that place. I found the people were considerably alarmed over the prevalence of diphtheria in the surrounding country, and on account of four recent deaths from that disease and membranous croup in the village. I met the board of health, and upon inquiry found that very little was being done by the board. A public funeral in a case of diphtheria had been held, physicians had failed to report cases of contagious disease, and quarantine had been but a pretense. But little effort was being made to enforce the rules of the board, mainly from lack of an understanding of the powers of a board of health. Rules and regulations had not been adopted. The powers and duties of a board of health were fully explained to the members, and a set of rules and regulations furnished for their guidance.

Respectfully,

C. O. Probst,
Secretary.

REPORT ON DIPHTHERIA AT NEWARK.

To the State Board of Health:

Gentlemen: November 5th, in response to a resolution of the board of health of Newark, I visited that city. Diphtheria made its appearance there in August, and on that account the schools delayed opening. Later, the board of education decided to open the schools but on request of the board of health, diphtheria still continuing, again delayed it. A day or two before I went to Newark the schools were opened against the protest of the board of health, and it was on this account, principally, that I was summoned there by the board of health. The health officer reported that from August 30th to the day school, opened (November 14) there had been fifty-eight cases of diphtheria with twelve deaths; eight cases of membranous croup with eight deaths, and forty-two cases of scarlet fever with one death. Quarantine was being rather loosely enforced; considerable trouble was experienced in getting reports of cases from some of the physicians, and a Dr. McClure was arrested for failing to report a fatal case of diphtheria. The body of a child that evidently died of diphtheria was shipped from Newark to Delaware, and introduced diphtheria into that city. The physician in this case certified that the child died from bronchitis. I visited a number of the cases in company with the health officer, and in the afternoon met the board of health. I learned that the board had never adopted a set of rules and regulations, and that the order closing the schools had been adopted at a meeting of the board when less than a quorum was present. The advantages of having standing orders and regulations were pointed out, and the board appointed a committee to prepare regulations and submit them to the board for adoption.

I advised an inspection of all school children, and physicians were appointed to visit each school on the following day and examine each child present. Cases of contagious diseases or suspicious cases were to be sent home at once. Children not at school were ordered to bring a proper certificate from a physician upon their return, or be refused admission. Subsequent to my visit, the health officer wrote that four children with diphtheria and two with scarlet fever were found in school; sixty-four children were sent home on "suspicion."

Dr. McClure was convicted of failing to report a case of diphtheria and was fined five dollars and costs.

The health officer reported, November 21st, that proper quarantine and other measures for suppressing the epidemic were being strictly enforced, and that most of the new cases occurring were in families where the disease has already appeared. For the four weeks ending December 5th, he reported sixty-two cases with one death from diphtheria, and twenty-five cases of scarlet fever.

Respectfully,

C. O. Probst,
Secretary.

REPORT ON DIPHTHERIA AT SOMERVILLE.

To the State Board of Health :

Gentlemen : I was appointed about the 20th of November to visit Somerville, Butler county, Ohio, on account of an outbreak of a disease the character of which appeared to be in doubt. The day before my intended visit I was telephoned to by Dr. Abbott, who until recently was the health officer of the village, that there had been an agreement in regard to the character of the disease ; that it was diphtheria, that it was abating, and in his opinion it was unnecessary for me to visit the place. I asked him to notify the mayor or health officer of the purport of our interview and say to them that I would not visit the place until notified that my presence was desired by them.

On December 4th I received a telegram from the health officer requesting me to go to Somerville as the disease had broken out again. I went there on the morning of the 5th instant, and with the health officer, Abram Kapp, and Dr. Abbott, I visited two families in one of which there were two children sick and in the other one. All were cases of diphtheria. In the family where the two children were sick, two had died in the last month from the same disease. Other deaths had occurred in the village within the last month which were undoubtedly due to diphtheria, though not reported as such. One death had occurred from membraneous croup, but the case had not been reported to the health officer, the physician in attendance declaring that it was not contagious. So far but little attention had been given to preventive measures. The disease was at first declared to be tonsillitis and non-contagious. No disinfection had been resorted to. The houses were not quarantined nor placarded, the patients were not isolated, children from families in which there were cases of the disease were permitted to go to school. At the time of my visit only one house was placarded though a placard was to be put on the other house immediately.

I have advised the health officer to promptly prosecute any physician who fails to report any contagious disease, including membranous croup, to placard the house where contagious diseases exist, to quarantine the patients and nurses, and I have asked the Secretary to send to the local board of health circulars of information in regard to diphtheria to be distributed among the people. I believe the health officer, who has been in office but a few weeks, will do his duty if supported by the local board, and I hope to hear soon of the arrest of the disease in the town.

Respectfully submitted,

(Signed) BYRON STANTON.
Committee.

DIPHTHERIA AT WAYNESFIELD.

WAYNESFIELD, OHIO, January 5, 1897.

C. O. PROBST, M. D., Columbus, Ohio.

DEAR DOCTOR: We are having an epidemic of sore throat here which has continued for some two months or more. There have been no deaths except from membranous croup as a complication from exposure. The soreness originates in the pharynx as a rule, but sometimes in the larynx, and occasionally it begins in the form of a tonsillitis. It is generally ushered in with a chill followed by a high fever for a few hours. Some cases have no pyrexia of any consequence. There is aching of the body generally, and in some cases a severe headache alone accompanies the fever. There is seldom any swelling of the cervical or maxillary glands. The fauces are red, not white, with muco-serous exudate; and a few small cancers, from one to three and four on fauces, but as a rule are confined to pharynx. I presume you know the nature of the disease better than I can describe it on paper, because it is a general epidemic. We have some parties here pronouncing it diphtheria, but I have had about thirty cases, but so far no deaths. It does not appear to be contagious but epidemic here. The idea of old people aged fifty and sixty years taking diphtheria, while their children do not have it, and quarantining them, is a new idea to me. I want your opinion of this disease and whether it is necessary for me to quarantine every case of sore throat? (La Grippe.)

An early answer will oblige,

Yours very respectfully,
S. B. LUSK, M. D.

COLUMBUS, OHIO, January 18, 1897.

C. O. PROBST, M. D., Secretary of the State Board of Health.

DEAR SIR: Having been commissioned by you to investigate the suspected epidemic of diphtheria at Waynesfield, Ohio, I present the following report:

Eight sterilized swabs were sent January ninth to Dr. S. B. Lusk, of that town, and six promptly returned the succeeding week. Cultures made from the swabs showed the presence of the bacillus diphtheriae in four of the cases, as follows:

CASE I. E. F., age twelve years, had been sick eight days; attack commenced with a chill, followed by fever and sore throat, tonsils, fauces and pharynx showed signs of inflammation, and in a few days a few areas of membrane appeared on tonsils. Result, recovery. Bacteriological examination showed presence of baccillus diphtheriae.

CASE II. W. G., age fifteen years, sick five days; attack opened with a chill, followed by high fever, headache, aching throughout body and sore throat. Soon developed three or four patches of membrane on pharynx. Moderate bronchitis accompanied the illness. Result, doing well. Bacteriological examination, bacillus diphtheriae present.

CASE III. A. D., age ten years, length of illness unknown. Attack opened with a chill followed by fever and sore throat. Tonsils enlarged and when seen by Dr. Lusk, there were one or two patches on their surfaces. Had some cough, at one time "croupy" in character. Child not confined to bed. Result, doing well. Bacteriological examination, bacillus diphtheriae present.

CASE IV. L. D., age thirteen years, sick ten days; attack opening with chill followed by fever and sore throat; tonsils and fauces reddened with small patches of membrane; marked hoarseness present and cough "croupy" in character: patient "choking up" occasionally; some gastric irritability. Result not stated. Bacteriological examination, bacillus diphtheriae present.

CASE V. J. H., age two and one-half years, sick twelve days; attack opened with chill followed by fever; marked hoarseness; cough, croupy; tonsils and fauces reddened; no signs of membrane. Result, doing well. Bacteriological examination, presence of staphylococci pyogenes aureus; no bacilli of diphtheriae found.

CASE VI. T. H., age four years, sick twelve days; attack and symptoms as in the preceding case, but not so severe. No hoarseness nor croupy cough noted. No signs of membrane. Result, recovery. Bacteriological examination, presence of organisms of suppuration as in case V. No bacilli of diphtheriae found.

Respectfully submitted,

J. H. J. UPHAM, M. D.

REPORT ON TYPHOID FEVER AT BOYS' INDUSTRIAL SCHOOL, LANCASTER.

To the State Board of Health, Gentlemen:

The Dairy and Food Commissioner referred a letter to me which he received from the Steward of the Boys' Industrial School at Lancaster, requesting an examination of their water supply. On inquiry I learned that a number of cases of fever existed at the school and that the water supply was suspected to be polluted. I visited the school September 13, and made an investigation, in company with the attending physician, Dr. C. E. Reese. There was much doubt as to the nature of the disease. The patients suffered from a continuous fever, which was often ushered in abruptly, and in many cases lasted but six or seven days. In other cases the fever continued for three weeks. The bowels were but little disturbed. The rose spots of typhoid fever were absent in all the cases. Quinine even in large doses, and hypodermically administered, had but little, and no lasting, effect upon the temperature. In eighty-six cases, counting both epidemics, there were no deaths. Returning home I requested Dr. Upham to go to Lancaster at once and examine the patients for typhoid fever by the Widal method, and also to look for the malarial organism in blood from the patients. On returning Dr. Upham made the following report:

COLUMBUS, OHIO, September 16, 1897.

C. O. PROBST, M. D., Secretary of State Board of Health,

DEAR SIR: At your request I went to Lancaster, Ohio, on the 15th instant, and, with Dr. Reese of that city, saw the following cases, selected as typical of the epidemic of fever now present at the Boys' Industrial School.

No. 1. H. Goff, age 17, admitted to the hospital Sept. 10; had been complaining for two days of malaise, loss of appetite and constipation. Temperature on admission 102.5; fever has been constantly present since then. The morning temperature varying from 102° to 104.2° on the 15th, the highest recorded.

He is apathetic, has no appetite, is constipated, tongue is coated with white fur, papillae prominent, and there is an ulcer on right edge. Abdomen is flat, with diffused tenderness on pressure. Spleen slightly enlarged. *No rose colored spots* present. No delirium nor stupor. Urine treated with diazo solution gave moderate reaction. Typhoid bacilli in pure culture treated with blood from patient remained separate and motile.

No. 2. *H. Markley*, age 18 years, admitted to the hospital Sept. 13th; had been complaining of headache and malaise since the 7th inst. Fever has been constantly present since admission, reaching highest point on the 15th, 104.2°. At present he has headache, malaise, appetite good, bowels loose, not unusually fetid; tenderness in right inguinal region, abdomen not distended, tongue slightly coated, papillae prominent. No apathy, delirium or stupor. No history of previous attacks of fever. Spleen not enlarged. Diazo test negative. Serum test negative.

No. 3. *G. Sterling*, age 34, good history, no previous fevers. Seized with chill on September 5, and had a second on September 6, followed by moderate fever; temperature on the 15th 102°. Has no headache, appetite at first lost, now fair, bowels constipated, tongue thickly coated, eyes clear; no stupor, delirium or subsultus tendinum. Abdomen flat, tenderness on pressure in epigastrium. Spleen not enlarged; no rose colored spots. Diazo reaction negative. Serum test negative.

While the disease present in these cases is undoubtedly gastro-intestinal in origin and infectious in character, I cannot say that it is *typhoid fever*, but consider it a form of simple continued fever, becoming epidemic through a contaminated water supply.

Very respectfully,

(Signed) J. H. J. UPHAM, M. D.

On September 23, two members and the secretary of the board of trustees of the school, called on me, and a conference was held. I urged upon them the importance of securing a permanent supply of pure water. On the same date the following communication was sent to the board of trustees:

COLUMBUS, OHIO, Sept. 23, 1897.

MR. C. D. HILLES, Secretary of Board of Trustees, the Boys' Industrial School, Lancaster, O.

DEAR SIR: My attention has been called to the sanitary condition of the Boys' Industrial School on account of the occurrence of a number of cases of fever among the inmates.

I visited the school on the 13th instant, to inquire into the cause of the sickness. The attending physician, Dr. Charles E. Reese reported that from July 5, 1897, the date of the first case, to September 16, thirty-nine cases of fever have occurred in the school; thirty-one among the boys and eight among the officers. The fever has been severe in some cases, lasting from two to three weeks, but so far there have been no deaths. Dr. Reese reports further that last year, commencing July 9 and continuing till August 29, this same sickness prevailed in the school. During that time there were forty-seven cases, forty-three boys and four officers. In both epidemics the cases were pretty evenly distributed among the different families, indicating a general and not a local cause. An examination of the sewerage and water supply leave little doubt as to what this is.

Ordinarily, the water is obtained from two sources, a deep well and a number of springs that are brought together at the pump house. The spring water is pumped to a stand pipe and distributed to the different buildings. The well is supposed to furnish all the drinking water; but the other supply is undoubtedly used daily for this purpose, and it is practically impossible to prevent this. The supply from the springs has been diminishing, and last year, to obtain a sufficient amount of water, it became necessary to use water from a small creek. This creek passes within a few feet of the reservoir for spring water at the pump house. A short distance *above* the pump house it is joined by a small stream which receives a large part of the sewage from the Boys' Industrial School. At the time of my investigation at least half of the water being pumped to the stand pipe was taken from this sewage polluted creek. A chemical examination of the creek water at the pump house showed the presence of sewage.

Last year water from the creek was turned into the mains about June 15, and the first case of fever occurred July 9. This year, although comparatively wet, it was necessary to resort to creek water much earlier, some time in April. The first case of fever this year occurred July 5; but the creek had plenty of water in it until the middle of June; which would greatly dilute the sewage and lessen the chances of infection.

The sickness at the school, this year and last, has been caused, in my opinion, by the use of this polluted creek water.

The situation is one of much gravity, as cases are still developing (two new cases have been reported since September 16th,) and steps should be taken at once to secure an adequate supply of pure water; for every day's continuance of present conditions is a menace to the health of the school.

In this connection I would respectfully suggest that consideration be given to the proper disposal of the sewage from the school. Instead of turning it into the creek, spoiling it for all purposes, it should be applied to the land, where it may be purified and at the same time utilized.

Trusting that this matter will receive prompt and serious attention,

I have the honor to be,

Very truly yours,

(Signed) C. O. PROBST,
Secretary.

Following is a letter received from Mr. Hilles, a copy of a letter sent to the governor:

LANCASTER, September 24, 1897.

His Excellency, ASA S. BUSHNELL, Governor of Ohio, Columbus, Ohio.

HONORED SIR: I am directed by the Board of Trustees to transmit to you, as president of the Emergency Commission, which I do herewith, a copy of a letter from Dr. C. O. Probst, secretary of the Ohio State Board of Health, embodying his report on the epidemic of fever in this institution. The letter in question absorbs the report of the physician of the institution, Dr. Charles E. Reese, and the observations of specialist Upham, the former treating on the invasion of the sickness in 1896 and its recurrence this year and the latter on its classification and probable origin.

The consensus of opinion is that the fever had its origin in polluted creek water which was used during the drouth and which must still be used because the supply of spring water, never too abundant, has materially diminished, while the demand for it has greatly increased with the unprecedented influx of boys.

In concluding his report, Dr. Probst says: "The sickness at the school, this year and last, has been caused, in my opinion, by the use of this polluted water. The situation is one of much gravity, as cases are still developing, and steps should be taken at once to secure an adequate supply of pure water; for every day's continuance of the present conditions is a menace to the health of the school."

The Board of Trustees desire to cooperate with the State Board of Health, but in as much as the recommendations and requirements of the latter contemplate a most radical reorganization of our water and sanitary systems, they will, if adopted and executed, entail an expenditure in excess of our appropriation balances. We are compelled, therefore, to appeal to the Emergency Commission for assistance, and respectfully urge you to assemble the Commission for the consideration of the matter, with the hope that we will be authorized to expend a sum sufficient to secure the services of a competent sanitary engineer, who should investigate the present system with a view to suggesting reforms and relief and make preliminary plans and an estimate of the cost of developing an adequate supply of pure water.

We have long since outgrown our water supply, which at no time exceeded fifty per cent. of the average supply of cities and towns generally. Even at the time when water was the most plentiful here, we had not enough to permit the installation in all of our buildings of water-consuming apparatus for the disposal of excreta, to displace the primitive, out-door sewage stalls.

With high personal regard, I remain,

Very truly yours,

(Signed) C. D. Hilles,
Secretary.

October 5th, Mr. Hilles telephoned me from Lancaster that one of the patients had died, and that a post mortem had been refused. I requested Dr. Upham to go to Lancaster and obtain a post mortem if possible. He went the same day, and has reported as follows:

C. O. Probst, M. D., Secretary of State Board of Health,

Dear Sir: The autopsy held on the 5th instant on the body of Herman Markley, (case No. 2 of former report), of the Boys' Industrial School, showed the cause of death to have been *typhoid fever*.

He had been sick for eighteen days; the symptoms, early indefinite, became suggestive of typhoid toward the close of his illness, with indications of perforation of the intestine on the morning of the day of his death.

His illness at first so closely resembled the fever epidemic at the School that there can be no doubt that that disease throughout has been a typical form of typhoid.

Very respectfully,

(Signed) J. H. J. Upham, M. D.

The Governor authorized the Trustees to employ an engineer to report a plan for securing a new water supply, which was done.

The use of the polluted creek water was stopped, with the result that only three additional cases developed, making forty-three cases and two deaths in all.

Respectfully,

C. O. Probst,
Secretary.

REPORT ON TYPHOID FEVER AT UNION STATION.

To the State Board of Health:

Gentlemen: The board of health of Union township, Licking county, reported the prevalence of typhoid fever at Union Station and requested an investigation to be made. Later, the directors of the Licking county Infirmary, near Union Station, reported two cases of typhoid in that institution and asked for an investigation.

I went to Union Station September 19th, and met Dr. Frank Letherman, the attending physician for all cases except the infirmary cases, to whom I am indebted for much of the information gained.

It appears that the village, which consists of a small group of houses, had been free from typhoid fever for a long period of years, until two years ago this fall. At that time two cases occurred in the family of James Weir. The origin of these cases is unknown. The history of these cases—diarrhœa, hemorrhage and long continued fever—leaves little doubt of their being typhoid fever. The mother of the patients reported that the stools were buried in the ground, but neighbors report that they were disposed of without any precautions being taken.

The village is placed on a hillside, with stables, privies (which are usually without vaults) and chicken coops above the wells.

The first case this year occurred about July 10th, in the family of John Wilson. This family lives just across the street from a family named Haines, to whom they are related, and where they frequently visit. The Haines' house is next door to the Weir house, and the Haines' well is so located as to be polluted by surface water coming from the Weir's yard. It was impossible, therefore, for the Haines' well to become specifically polluted by the drainage from the cases in the Weir family, supposing the germs to live in the soil this long. There were three cases in the Wilson family. All of the patients were reported to have used water from the Haines well. A servant in the Wilson family also contracted the disease, and came down with it after going to her home a few miles away.

About the same time cases occurred in the Haines family, where there were five cases. There were two cases in the Goff family, one fatal; two in the Morris family, and one case (a girl living in the country some miles from the village) all of whom had visited the Haines family and presumably used water from the Haines well.

At the infirmary there were two cases. Both of the patients had worked in a corn field which is adjacent to the village. Water was carried from wells in the village and was drank by the patients. It is not known that this water came from the Haines well.

There was no apparent cause for typhoid fever at the infirmary. The drinking water is from two wells, well located as regards pollution. Water for other purposes is from a spring. This spring is used about the dairy. There is some opportunity for it to receive surface water, which the superintendent agreed to remove by making certain changes that were recommended. It may be remarked, parenthetically, that the infirmary was in excellent sanitary condition except for one building where the closets have no arrangements for flushing except by hand; and the disposal of the sewage, which flows into a ditch on the farm. This ditch was very foul. The directors and county commissioners were present at the infirmary when it was inspected; and it was practically agreed to provide new closets for the building spoken of, and a water tower, which would give them plenty of water for flushing, and for protection against fire. The latter is badly needed as two of the buildings are illy planned, as regards escape in case of fire.

In all there were twenty cases and one death from typhoid fever, traceable to Union Station, and the majority of them to one well. The water in this well, it should be stated, was foul looking and had a bad odor. It was out of use when seen.

The location of the village and the geological formation of its site are such (the wells are shallow and in a very loose shale) that the water supply will always be in danger of pollution. Tight earth boxes should be provided for all closets, and care taken to prevent the accumulation of manure or other filthy substances where they are liable to drain into the wells. There is one spring in the village, used by one family. It is on the hillside, above all local sources of contamination. It would probably afford sufficient drinking water for the entire village, and it would be advisable for the villagers to join in a scheme for obtaining water from this source.

Respectfully submitted,

C. O. Probst,

Secretary.

Public Water Supplies.

REPORT ON THE PROPOSED WATER SUPPLY FOR CANTON.

To the Ohio State Board of Health :

GENTLEMEN : The first city water supply for Canton was derived from Myers' Lake, about two miles from the city, and was introduced in 1870. Inside of two years the supply ceased to be sufficient in quantity and the quality of the water was by no means such as had been anticipated. In 1872 recourse was had to the west branch of the Nimishillen creek. The creek supply was sufficient in quantity but was not supposed to be of sufficient purity. Owing to increased contamination by reason of augmented population, and also owing to the higher standard of purity of water which a better popular understanding of the subject induced, this water supply was decided to be unsatisfactory, and the drilling of deep wells in the valley of the same creek was commenced about ten years ago.

Of these deep wells through which the water rose to a few feet above the surface, thirty-three were put down in the valley of the creek. These wells furnished approximately one million gallons of water daily, and the same was quite satisfactory, although the degree of hardness was above that which could be desired.

Owing to increase in population of the city, and to the greater demand upon the water supply, the well water became insufficient in quantity. The daily demands of Canton range from two to six or seven million gallons daily. The water now supplied in excess of that derived from the wells is still taken from the west creek. During the past year there has been an epidemic of typhoid fever which was distinctively traced by the local board of health to the contamination of the water in this creek by contact with refuse from houses where there had been cases of the disease. Owing to these facts the local authorities have given careful attention to the subject of the water supply for the Canton of the future.

Three streams are joined together upon the town site of Canton. One is the creek already alluded to which is known as the west branch. The characteristics of the surface features of the watershed of this creek are, first, high lands ajacent to and contributory to the stream causing an active flow of storm water and the removal of the bulk of the same through the surface streams. Abundant limestone accounts for the extreme hardness of the water. The contributory area is twenty-three square miles.

The east branch of the same stream drains an area of approximately thirty square miles. The contiguity to this stream is very sparsely supplied with springs. In dry times the water in the stream almost ceases to flow. This valley offered few inducements for investigation with a hope of finding a sufficient supply of underground water.

The middle branch of the stream has a watershed of about forty-six square miles. It is characterized by comparative absence of limestone, by a comparatively level area facilitating large absorption of precipitated moisture, by unusual abundance of lakes near the origin of the stream, and by abundant evidences of the presence of underground water over nearly the whole length of its course. Had the popular appreciation of the superiority of filtered underground water been as lively at the time of the introduction of the water supply of Canton as it is to-day, the depression of this stream would certainly have had the first claims to attention. Canton, however, in that instance, pursued a course adopted by most other places and directed attention only towards visible supplies.

Owing to the circumstances above narrated, and the badness of Canton's water supply, the interest in this valley of the middle branch as a source of water has been sharply accentuated. Last fall the water authorities obtained an option on twenty acres of land which seemed well adapted to the purpose, situated about two miles north of the city in a locality as free from any objections of a surface character as such a place could be in a rich farming district, and ordered the sinking of two test wells about 200 feet apart. These wells are 120 feet deep, passing first through alluvium about nineteen feet, and the other portion of the way through sand and shale rock. At the depth of something over 100 feet the white sand rock is reached which contains the water. This water flows freely out at the top of the well, having a sufficient pressure to reach fifteen or twenty feet above the surface of the ground. By the application of a test pump it was found that each well would furnish about 3,000,000 gallons per day of twenty-four hours. Pumping at that rate reduced the water level never more than eight feet below the surface of the ground.

The pumping of one well had no visible effect on the outflow from the other well The drill wells are six inches in diameter, the superincumbent stratum of earth having been cased off and the casing set neatly and tightly into the top of the rock stratum. The chemical nature of the water will appear from the analysis made by Prof. N. W. Lord, of the Ohio State University, which is hereto attached and made a part of this report.

COLUMBUS, OHIO, March 3, 1897.

Dr. C. O. Probst, Secretary, State Board of Health, Columbus, Ohio.

MY DEAR SIR: Following is report of analysis of samples of water marked Canton, Ohio, No. 1 and No. 2. Received February 26, 1897.

Parts per 100,000.

	No. 1, deep well. Middle branch.	No. 2, deep well. West creek.
Oxygen required	0.11	0.13
Free ammonia	0.0032	0.0298
Albuminoid ammonia	0.0064	0.0038
Nitrous acid	none	0.004
Nitric acid	0.02	0.07
Chlorine	0.25	1.00
Temporary hardness	8.5	9.5
Permanent hardness	5.5	6.5
Total solids	25.0	34.0
Volatile solids	5.0	4.0

Water No. 1 is very pure and chemically of first quality. Water No. 2 is objectionable from its high ammonia and nitrites. The ammonia and nitrites would pass, as the water is from a deep well, but for analysis of No. 1. If No. 1 represents the normal deep water of Canton, No. 2, with its increase in ammonia and nitrites and *chlorine*, is certainly contaminated by sewage. No. 2 also contains notably more sulphates than No. 1, pointing to the same conclusion.

Yours very truly,

(Signed) N. W. LORD.

A few comments on this report will not be out of place.

Analysis No. 1 refers to the proposed new water supply. This water is from the valley of the middle branch and is here spoken of as "very fine and chemically of first quality." This is the water from which it is hoped that the city may supply its future needs. From the indications already given it will be seen that so far as quantity is concerned there is nothing to fear.

Analysis No. 2 refers to the deep well water which is now supplied to Canton from the well system in the valley of the west creek. Prof. Lord refers to this water in such a manner as to indicate its unfitness for use. In order that the water from well No. 2 may not be confused with the water from well No. 1, it is proper to say that the valleys from which these supplies were derived are not only separated by a distance of several miles, but by a ridge of considerable elevation. They are in different water-sheds. In the valley from which No. 2 was obtained, there is abundant limestone, considerable workings of coal, hilly and precipitous water-shed areas, while in the valley from which No. 1 was obtained, there is an absence of limestone, level country, and generally different geological formations.

The same company of well drillers put down all the wells in both valleys. While sinking the 33 wells constituting the underground supply from which specimen No. 2 was obtained, these well drillers found in the rock many faults. The drop of the drilling tool, a distance of from one to three feet through open crevices in the rock, was by no means an uncommon occurrence. Inasmuch as the stream is confessedly greatly contaminated, it can hardly be doubted that the surface water reaches the underground water furnished by the deep wells from which No. 2 was obtained in sufficient quantity to account for the objectionable quantities of ammonia, nitrites, and chlorine found in the deep wells from which that specimen was obtained. On the other hand, in sinking the two wells from which specimen No. 1 was obtained, in the valley of the middle branch, no faults whatever were found in the rock strata there.

I advise the approval of the water supply in the valley of the middle branch from which specimen No. 1 was obtained.

Respectfully submitted,
JOSIAH HARTZELL,
Committee.

CANTON, April 8, 1897.

OHIO STATE BOARD OF HEALTH.
OFFICE OF THE SECRETARY,
COLUMBUS, April 12, 1897.

MR. L. E. CHAPIN, City Civil Engineer, Canton, Ohio.

DEAR SIR: The State Board of Health has considered your application for the approval of the new water supply proposed for the city of Canton, the same to be obtained from deep wells situated about two miles north of the city in the valley of the middle branch of the Nimishillen Creek, and you are hereby notified that this water supply has been duly approved by said Board.

Yours truly,
(Signed) C. O. PROBST, Secretary.

By order of the Board.

REPORT ON PROPOSED WATER SUPPLY FOR CHAGRIN FALLS.

To the State Board of Health:

GENTLEMEN: The city council of Chagrin Falls appointed a committee consisting of Messrs. S. P. Harris, W. J. Wykoff and G. B. Huggett to recommend a water supply for that city, and they have recommended some twenty springs located about one and a half miles from the city as the source of supply.

On December 31st, with Mr. S. P. Harris, I investigated this watershed and the springs. These springs are located within a radius of three-fourths of a mile, and about one and a half miles from the city. There are no buildings or persons living on the watershed and part of it is covered by a fine forest, hence there is no danger of contamination from this source.

It is proposed to collect the water from these springs at a pump station and raise it 110 feet to the top of a hill to a storage reservoir, and from there deliver it to the city. From the storage reservoir it will have a fall of 210 feet.

Their engineer estimates the capacity of these springs at 244,000 gallons per day, which would be an abundant supply for their 2,000 population.

The water is soft. I do not hesitate to recommend this source of supply.

Respectfully,

R. D. KAHLE, Committee.

OHIO STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY.
COLUMBUS, OHIO, January 11, 1897.

MR. S. L. WILKINSON, Mayor, Chagrin Falls, O.

DEAR SIR: The State Board of Health has considered your application of December 22, 1896, for the approval of a public water supply for the village of Chagrin Falls, Ohio, to be obtained from twenty or more springs located about one and a half miles from the village, the water to be pumped to a storage reservoir and delivered by gravity, with an estimated capacity of the springs of about 244,000 gallons per day.

You are hereby notified that said water supply has been approved.

Yours truly,

(Signed) C. O. PROBST,
Secretary.

By order of the Board.

REPORT ON PROPOSED WATER SUPPLY FOR THE INSTITUTION FOR THE BLIND, COLUMBUS.

To the Ohio State Board of Health:

GENTLEMEN: At the last meeting of the Board, four of the members visited the Ohio Institution for the Education of the Blind, and were shown the well which it is proposed to use for a water supply. It is a drilled well, nearly seventy feet deep, in gravel overlaid with clay and hard-pan. The grounds at the institution are large so that there are no sources of contamination within seven or eight hundred feet, possibly, of the well. The report of the chemist is given below:

COLUMBUS, OHIO, February 1, 1897.

DR. C. O. PROBST, Secretary of the State Board of Health.

MY DEAR SIR: Following are results of analysis of sample of water marked "Blind Asylum," received January 25th:

Parts per 100,000.

Oxygen required	0.13
Free ammonia	0.0124
Albuminoid ammonia	0.0046
Nitrous acid	none
Nitric acid	trace
Chlorine	1.05
Total solids	51.0
Loss on ignition (volatile solids)	6.5
Temporary hardness	34.5
Permanent hardness	7.0

The only thing in this water in any way suspicious is the high free ammonia, but all the other elements are so low that if the water is from a deep well this would pass as unimportant. The section of the well shown in the sketch sent me together with the amount of mineral matter in this water would indicate a deep supply, therefore the water may be considered pure.

In a shallow well I should regard the high free ammonia as suspicious.

Yours very respectfully,

(Signed) N. W. LORD.

I would respectfully recommend that this supply be approved.

Respectfully yours,

C. O. PROBST,
Secretary.

OHIO STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY.
COLUMBUS, February, 10, 1897.

Mr. R. W. Wallace, Superintendent of the Institution for the Blind, Columbus, Ohio.

DEAR SIR: The State Board of Health has considered your application for approval of a water supply for the institution for the blind, to be taken from a deep well located on the grounds of the institution, and you are hereby notified that the same has been approved. I enclose herewith, for your information, a copy of the chemist's report.

Yours truly,

(Signed) C. O. PROBST.
Secretary.

By order of the Board.

REPORT OF THE PROPOSED WATER SUPPLY FOR GIBSONBURG.

To the Ohio State Board of Health.

GENTLEMEN: Having been appointed at the last special meeting of the Board to investigate and report on the water supply of the village of Gibsonburg, Sandusky county, Ohio, I herewith respectfully submit the following report:

On May 12, 1897, I visited the village of Gibsonburg and in company with the president and one of the members of the water works committee visited the well that has recently been put down for the purpose of supplying this village with water. The well is located about one-fourth of a mile east of the town, and there are no buildings nearer than five hundred feet of the well. The nearest building is a dwelling house. The country around about Gibsonburg being very level and not adapted to natural drainage, they have no system of sewerage in the town. The surface soil where the well is located is a dark loam; beneath this is a dark blue clay some three or four feet in thickness; then comes about five feet of gravel when they strike the limestone rock. The depth of the well is 287 feet from the surface of the ground. The diameter of the well is ten inches inside the casing and the casing extends down fifty feet. The water stands in the well within two feet of the top and gives a supply of 4,600 gallons per hour without lowering the water in well more than one foot. The bottom of the well is in the solid rock, and while the water is quite hard it has the appearance of being of good quality and sufficient quantity to supply the town with all the water they need. I would therefore recommend the approval of the well if the analysis does not show anything to the contrary.

Respectfully submitted,

W. T. GEMMILL,
Committee.

COLUMBUS, OHIO, May 24, 1897.

DR. C. O. PROBST, Secretary of the State Board of Health, City.

MY DEAR SIR: Following are results of analysis of the sample of water marked "Gibsonburg" you sent me May 22d:

	Parts per 100,000.
Ogygen required	0.16
Free ammonia	0.0002
Albuminoid ammonia	0.0102
Nitrous acid	trace.
Nitric acid	none.
Chlorine	0.25
Temporary hardness	28.0
Permanent hardness	0.8
Total solids	36.0
Volatile solids	7.0

The water is very low in all objectionable substances except the "albuminoid" ammonia. This is rather high. From the low chlorine and nitrates I should think that this "albuminoid" ammonia probably came from a little dissolved vegetable matter and was harmless.

I consider the water good as far as analysis goes. It contains some iron.

Yours truly,

(Signed) N. W. LORD.

OHIO STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
COLUMBUS, June 4. 1897.

To the Board of Water Works Trustees, Gibsonburg, Ohio.

DEAR SIRS: The Board of Health has considered your application for approval of a public water supply to be obtained from a well two hundred and eighty-seven feet deep, or thereabouts, situated about a quarter of a mile east of the village. You are hereby notified that the proposed supply has been approved by the Board. I enclose herewith a copy of the chemist's report upon the sample of water from the well.

Yours truly,

(Signed) C. O. PROBST, Secretary.

By order of the Board.

REPORT ON PROPOSED WATER SUPPLY FOR HIRAM.

To the State Board of Health.

GENTLEMEN: Some time ago I was requested to investigate the proposed water supply for Hiram, Ohio, and would report as follows:

The village has a resident population of 400, and a transient population af 350 people. It is built upon the rocky ridge which divides the Mahoning valley from the lake basin, and has an elevation of abou 300 feet above Lake Erie. It is an educational centre, Hiram College being located there. There is no manufacturing, and the interests of the vicinity are purely agricultural.

It is proposed to obtain the supply from a series of springs which have their origin at the summit of the ridge, collected at this point, and by gravity (fall 100 feet) transferred to a reservoir, and thence, after a fall of 30 feet, to the distributing station. The source of the supply is ideal,the adjacent land will be owned by the village and not subject to contamination of any kind. The amount of the supply, 30,000 gallons per day, as it is said by actual measurement, seems to me somewhat insufficient; but in view of the character and vocation of the people it may be sufficient for present wants. Should it in the future prove insufficient, an additional supply can be obtained from adjacent springs. The report of the chemical analysis by Professor Lord shows the water to be one of exceptional purity.

I therefore recommend that the Board approve the supply.

WM. T. MILLER.
Committee.

COLUMBUS, OHIO, November 6, 1896.

DR. C. O. PROBST, Secretary State Board of Health.

MY DEAR SIR: Following is analysis of sample of Hiram spring water which you sent me:

	Parts per 100,000.
Oxygen required	0.065
Free ammonia	none.
Albuminoid ammonia	0.0009
Nitrous acid	none.
Nitric acid	1.03
Chlorine	0.30
Temporary hardness	5.0
Permanent hardness	1.3
Total solids	8.0
Volatile solids	1.8

The water is organically very pure. It is clear and colorless, with no sediment. The only thing about it needing caution is the nitric acid, but if this water is not from shallow wells or streams, but is a spring or deep well water, this is without significance and the water must be pronounced very pure.

Yours respectfully,

(Signed) N. W. LORD.

OHIO STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
COLUMBUS, December 31, 1896.

Prof. GEORGE H. COLTON, President Board of Trustees, Hiram Hamlet, Ohio.

DEAR SIR:—The State Board of Health has considered your application for approval of a public water supply to be obtained from several springs located beyond village limits.

The chemical analysis of the proposed supply (a copy of which is enclosed herewith) shows it to be of exceptional purity. The quantity, 30,000 gallons per day, is considered barely sufficient for present needs, and allows nothing for future growth of the college or village. Should you be able to increase this now to 40,000 gallons per day, as alleged, this would give, with 750 inhabitants during college term, only 53⅓ gallons per capita daily. The average daily per capita supply in American cities having water works is about 100 gallons. It will, therefore, be advisable for you to secure as soon as possible additional sources of supply, to be held in readiness for future needs. We also suggest that you require all water users to be supplied by meter, which will cut down the waste. Care must be taken in bringing the water from the various springs to the collecting well or reservoir that no surface water is admitted; and this well or reservoir must be constructed so as to cut out surface water.

With this proviso the proposed water supply for the village of Hiram is hereby approved.

Respectfully,

(Signed) C. O. PROBST,
Secretary.

By order of the Board.

PLAN PROPOSED FOR PURIFYING THE WATER SUPPLY OF LAKESIDE.

CLEVELAND, OHIO, May 22, 1897.

Dr. PROBST, Secretary State Board of Health, Columbus, Ohio.

DEAR SIR :—As per your request, we send the following statement, regarding the proposed filtering of the water at Lakeside during the coming season, which commences on or about July 6th, and continuing thereafter for between five and six weeks.

In the first place we propose to close the wells from which much of the drinking water was obtained, and especially the one at the chapel and also at the Bradley Temple. The former is the only one around which any suspicion centered, still, we think it will be best to close both. The well in the park has not been used for two years past and will not be opened again.

We have two plans now before us for supplying the necessary amount of water for drinking purposes. First—

The Squier filter, a copy of whose catalogue we sent you on May 5th, see page 21 of the same. This we propose to set up in our engine house or pumping station and convey the water after it is filtered, through a special main to the hotel, drinking hall, drinking fountains, and at the points where the wells formerly were used. If one of the said filters is not adequate to the demand, others will be added at once to supply all that is needed. Second—

We have a large tank about ten feet in diameter, possibly more. This we can supply with the necessary brick or tile bottom, adding gravel and fine sand in proper proportions and the requisite depth, and thus make a filter in accordance with plans and specifications as found in Brittanica, Vol. 24, page 408 and 409, and also in Appleton's Cyclopedia, page 777, 778, 779, etc., the same being such as are used for filtering the water for London, Glasgow, Dublin, Stoke, etc., etc.

We may suggest that authorities differ a little as to the velocity of the water through the sand, and also as to the amount or depth of the fine sand, but as the tank above mentioned will give an ample supply we propose to err, if at all, on the right side, and take the safe extreme. Any information you may give us or suggestions that will help us in this matter will be appreciated.

By either of the above arrangements, we believe we shall furnish a practically pure water for the people to drink, and certainly much purer in our estimation than that supplied any of our adjacent towns and cities.

We wish to call your attention again to this fact that as far as we can learn there has not developed a single case of typhoid fever among the resident families at Lakeside during the last ten years at least, and farther back than this we believe would be nearer to the fact. I have heard of a case of fever, that of a colored woman, but in this case the doctors could not agree, hence we are safe in saying that it was not typhoid. And this in face of the fact that there are between seventy-five and one hundred families living on the grounds all the year round, and all of them drink from the *wells which we propose to close.*

However, you may rest assured that we will do all in our power to avoid danger from any source, calling the attention of the people to the filtered water supply, and enforce by every means possible the use of the same.

That there will be some vigorous kicking when the people find their favorite water supply cut off, goes without saying, but we will meet it firmly. I may add, as in former letter, that if either of the above methods prove all that we hope them to, we are hopeful of sooner or later filtering all the water used upon the grounds.

Trusting that this will prove satisfactory to yourself and the Board, we beg to remain,

Yours respectfully,

THE LAKESIDE COMPANY,
J. S. ORAM, President.

OHIO STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
COLUMBUS, June 15, 1897.

Mr. J. S. ORAM, President Lakeside Association, Cleveland, Ohio.

DEAR SIR: Your statement as to proposed changes in the water supply at Lakeside was submitted by mail to the different members of the State Board of Health. The members are agreed that it will be impossible for the Board to approve in advance of either plan you suggest, as it will be impossible for us to tell what results can be achieved by these plans in the way of filtering water. The Board, I believe, would favor permitting you to proceed with such changes as you deem necessary, reserving the right to condemn if you do not succeed in getting proper results. The Board will be pleased, however, to advise with you in advance, if you desire, and to assist you in securing arrangements which would in all probability insure a good water supply.

There will be a meeting of the State Board of Health at the Hollenden Hotel, Cleveland, on the evening of June 23d, and if you wish to present this matter to the Board in any different light, you can have an opportunity to do so at that time.

Yours truly,

(Signed) C. O. PROBST,
Secretary.

REPORT ON THE CONDITION OF THE PUBLIC WATER SUPPLY OF LANCASTER.

OHIO STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
COLUMBUS, APRIL 16, 1897.

To the Board of Water Works Trustees, Lancaster, Ohio.

DEAR SIRS: In the fall of 1894 your Board made application to the State Board of Health to approve of a proposed addition to the public water supply for your city. After investigation the additional water supply was approved, subject to the conditions set forth in the following letter:

COLUMBUS, OHIO, October 9, 1894.

To the Board of Trustees Lancaster Water Works, Lancaster, Ohio.

GENTLEMEN: In compliance with your request, and with the provisions of section 2, of an act amending the act establishing the State Board of Health, I visited your city on September 15, 1894, and inspected the source of water supply proposed as an addition to your present supply.

The same is hereby approved subject to the following conditions:

(1) The spring near the old mill, at the upper end of the proposed filtering gallery, is not approved as a part of the new supply.

(2) The sewage which is now discharged onto the river bottom, near your filtering gallery, must be diverted to some distant point.

(3) The clay cover which protects the source of your water supply, and which will be cut through in extending the filtering gallery, must be replaced with proper care. As a complete sewerage system, which will provide for the needs of your entire city, is urgently demanded, and it is hoped will soon be built, it is suggested that in making the changes in sewerage above noted to guard against pollution of the water supply, attention shall be given to making the new sewer, which will be necessary, a part of the general system eventually to be constructed.

I enclose herewith a copy of the chemist's report on a sample of water representing your present supply, collected by your health officer, Dr. Hershberger, on September 25, 1894. You may reasonably expect that the new supply will be of the same character.

Respectfully,

(Signed) C. O. PROBST,
Secretary.

In the fall of 1896, it having been shown that the changes in sewerage spoken of in the letter of approval, quoted above, had not been complied with, and on account of the unusual prevalence of typhoid fever in Lancaster, another investigation was started with the view of determining the character and degree of pollution to which the public water supply is subjected.

Bacteriological examination of samples of water, by Prof. A. M. Bleile of the Ohio State University, did not show the presence of a large number of bacteria at that time, the samples, in fact, being nearly sterile. The health officer's report did not point conclusively to the public supply being the cause of the typhoid fever.

The aid of chemistry was then invoked to throw further light upon the question of possible pollution of the water, and the services of Prof. N. W. Lord of the Ohio State University were secured. Prof. Lord has submitted the following report:

COLUMBUS, OHIO, April 3, 1897.

DR. C. O. PROBST, Secretary State Board of Health, Columbus, Ohio.

MY DEAR SIR: On October 26, 1896, I reported to you the analysis of two samples of water from Lancaster, Ohio. In commenting upon this analysis I said that both waters were very pure in the sense of freedom from organic matter, but added "The *nitrates* are rather high but if the water is from deep wells or streams so situated as to show by the volume and character that the source of this is remote and not local, I should not consider it any cause for criticism of the water." After receiving my report you expressed yourself as not fully satisfied and requested me to make a more extended examination of the water supply in question, on the ground to determine if possible the source of the water. In accordance with this request I went to Lancaster on November 6th and in company with Dr. Hershberger and yourself went over the ground.

The water supply of Lancaster is pumped from a tunnel or filter gallery about 1,100 feet in length running parallel with, and about 600 feet east of the present channel of the Hocking River. It is stated to be below a layer of hardpan, but this is of little thickness and it is extremely doubtful if it really covers the tunnel. About 100 feet east of the tunnel runs the bed of the old canal now abandoned. This is at some little elevation above the level of the ground in which the tunnel is situated. East of this is the city, built up to the canal which latter appears to act as a "dumping ground" for more or less garbage. About 100 feet north of the end of the filter gallery and against the canal bank is a soap factory, drainage from which flows out onto and over the flat bottom ground in which the tunnel is driven. Just south of this factory is a flowing stream of some volume. Two or three sewers run over the flat ground between the canal bank and the river.

In order to determine the character of the ground water, and if possible its source, samples were taken and tested on the spot from several wells and other sources, the chlorine only being measured.

The following table gives the results of the tests made that day, with the depth of the well when obtainable:

Parts per 100,000.

1. Spring at mill	Chlorine	3.00
2. Surface water west of mill collected from pools	"	20.0
3. Brewery well, across canal, forty feet deep	"	4.90
4. Bellhorn well, north of above, thirty-five feet deep	"	3.25
5. Drove well in bottom just east of gallery	"	4.25
6. Waterworks from main	"	2 75
7. Cly well 600 feet south of waterworks, thirty-one feet deep	"	2.05
8. Eagle well 800 feet south of waterworks, thirty-five feet deep	"	2.20
9. Well across Hocking River 1,400 feet southwest	"	0.15

These figures seeming to indicate that the chlorine steadily increased as the city was approached made it desirable to trace the matter still further, and so Dr. Hershberger kindly undertook to get more samples and forward them to me at Columbus for analysis. He also sent me a map of Lancaster upon which the various wells were definitely located.

On November 17th the following samples were received, and they were analyzed for *chlorine* and *nitric acid*.

Parts per 100,000.

	Chlorine.	Nitric Acid.
1. Gender well	9.80	10.0
2. Pheeffer well, 22 feet deep	7.45	4.6
3. Smith well, 35 feet deep	5.50	11.6
4. Tricker well, 32 feet deep	63.50	6.0
5. Shreeves well, 75 feet deep	8.0	1.5
6. Guseman well, 18 feet deep	12.00	13.3
7. Tschoop well	6.30	0.66
8. Rhodes well, 30 feet deep	9.50	5.83

In order to bring out clearly the relation between the various samples of water, I have made the following sketch (see page 61) showing the location of each well or other source with reference to the waterworks, the river, and the city, and have indicated the approximate distance of the pumping station from each.

An inspection of this map shows clearly that all the city wells are thoroughly polluted with sewage. The high chlorine and above all the high nitric acid would only bear this interpretation. The chlorine varies greatly from well to well showing it is *not* a characteristic of the water of the locality as a whole, but is due to *local* sources. The very abnormal figures for nitric acid can only be explained by the constant accumulation and gradual oxidation of sewage in the soil, like a "niter bed" for making saltpetre.

Now assuming that the area east of the old canal bed is an extensive sheet of gravel (as it is) all permeated with sewage more or less thoroughly oxidized, the question of the source of the nitric acid in the city supply resolves itself into whether the waterworks tunnel derives its water in any part from this source. This is easily answered by considering the chlorine contents of the waterworks well and those south of it.

The chlorine at the Mill spring is 3.60, at the water works 2.75 and at the drove well just east of the tunnel 4.25. Going south we find the Cly well with 2.05, the Eagle well with 2.20. Across the river the chlorine in a well in the bottom is only 0.15.

The case appears to me to be this: The waterworks tunnel is supplied with underground water, a portion of which is derived from the surface water draining from the gravel of the town, carrying chlorine and nitric acid due to sewage.

The filtration and oxidation is, or was at the time this analysis of October 26th was made, sufficient to destroy and remove all the organic matter, but the nearness of the source of pollution is a constant menace to the safety of the supply, especially considering the highly impure character of the city soil; and should any accident interrupt the efficiency of the filtration, an outbreak of disease might follow.

The high chlorine and nitric acid of the waterworks water is not derived from a deep source, but due to surface pollution in the city of Lancaster, and the safety of the supply is dependent upon the efficiency of the soil filtration.

Respectfully submitted,

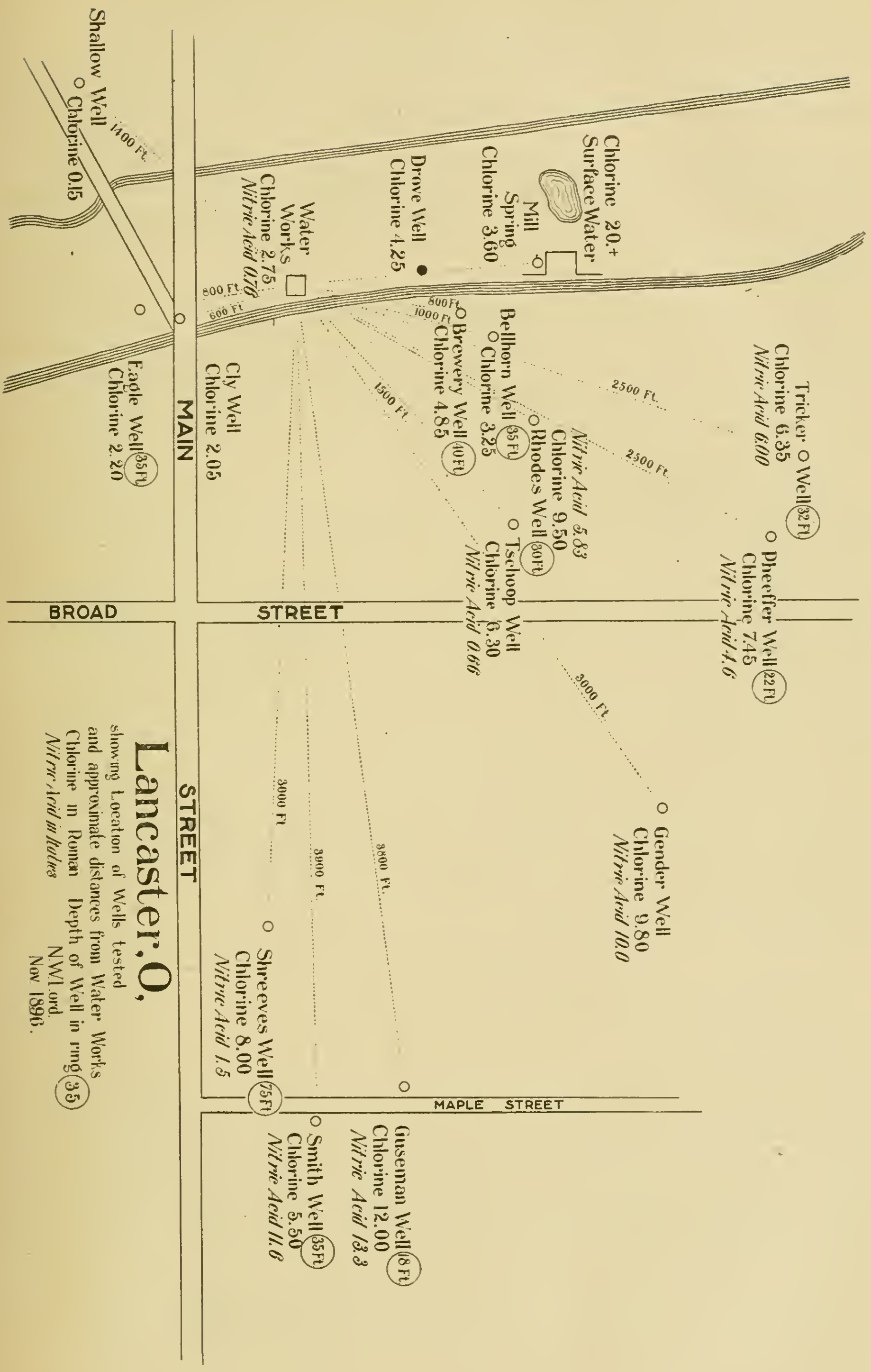
(Signed) N. W. LORD.

This report shows that a part of the public water supply comes from superficial ground water flowing from the city to the river, this water being exposed to various sources of pollution before reaching the filter gallery. It is also probable that the gallery at times receives a part of its supply from the ground between the river and the gallery, this ground being polluted with sewage from the city.

The water supply was carefully considered by the State Board of Health at the meeting held April 8th, 1897, and I was instructed to send you a copy of Prof. Lord's report, and to say that in the opinion of the Board, your public water supply is subject to pollution and may at any time become dangerous to the public health. In the light of Prof. Lord's investigation, the Board can see no way of guarding against this danger, and would advise that water from some other source be secured at the earliest possible time.

Respectfully,

C. O. PROBST,
Secretary.



Lancaster, O,
showing Location of Wells tested
and approximate distances from Water Works
Chlorine in Roman Depth of Well in ring (35)
Nitric Acid in Italics N.W.Lord.
Nov 1896.

REPORT ON THE PROPOSED WATER SUPPLY FOR MONROEVILLE.

To the Members of the State Board of Health.

Dear Sirs: At the request of the council of the village of Monroeville I visited that place on September 23rd. I spent the day in company with Mr. Paul Voorhees, who has been engaged as consulting engineer, in examining the course of the water supply proposed for the village.

Monroeville is a village of about 1,800 inhabitants, having increased its population but little, if any, since the census of 1890. It is located on the west branch of the Huron river in Huron county. The people have voted to issue bonds for $18,000 to build waterworks, and expect at the same time to put in an electric light plant, the purpose being to have one power house for both plants.

The village, as you will note by the accompanying map, is built almost entirely on one side of the river, there being but few houses on the other side. The bank of the river on the village side is quite steep, and is of rock; as is also the bed of the river. Just above the Main street bridge is a dam furnishing power for a mill. The dam is eight or ten feet high. Slack water extends back to a little below where the Lake Shore Railroad crosses the river.

At the time of my visit the river was quite low—as low as it ever gets I was informed—and was probably flowing at the rate of two and a half to three million gallons per day.

It is proposed to obtain water from the river, the exact location of the intake not having been fixed when I was there, though a preference was expressed by the engineer for the location marked on the map "B." This point seems to be the most favorable for a combined waterworks and electric light power house.

Location "C" is in deep water a few hundred feet above the dam, and on the side of the river opposite the town.

Location "A," you will note, is just above the mouth of a small creek which joins the river.

This creek is entirely dry, but during freshets carries considerable water. It passes through a corner of the village, and has several houses near it. There is also a small run passing along the outskirt of the village, which joins this creek at right angles after passing under the Lake Shore track. There are also several houses along this run. None of these houses, so far as known, drain directly into the creek or run, yet during storms the surface filth of yards would be washed into the river above either location "B" or "C."

The town is not sewered, except by a few short storm water sewers, all of which, except one, discharge into the river below location "B."

It is proposed, if this location is approved, to carry this drain below "B." A few hundred yards above "A" is a slaughter house, refuse from which is thrown upon the bank. This source of pollution will be removed. Should the village introduce sewerage, the natural course of the main sewer will be down Monroe street, and its outlet north of the Huron street bridge.

It is expected to filter the water by some form of mechanical filtration. Upon this subject the engineer writes me as follows:

BUFFALO, N. Y., September 29, 1897,

C. O. PROBST, M. D., Secretary Ohio State Board of Health.

DEAR SIR: Under separate cover, I send you eight blue prints of Monroeville, Ohio. Points marked "A," "B," and "C" are respectively the points at which the first, second and third samples of water were obtained from the Huron river on September 23rd. I delayed answering yours of the 25th until I could forward blue prints.

You request me to state what it is proposed to do in the way of purifying water by filtration. I have already recommended to the authorities of Monroeville that they should filter their water supply, although several other engineers visited Monroeville and made estimates of the cost of the works without recommending such filtration, and no provision has been made for the cost of such filters. There are just about 150 waterworks plants in your state, and less than 5 per cent. have filters of any kind, only two or three of which are mechanical filters. The population of none of these cities is much less than 5,000. I propose to recommend to the authorities at Monroeville that they put in one or two mechanical filters, of either the gravity or pressure type, that will have a guaranteed capacity of 250,000 gallons per day and will remove 97 per cent. of the organic and inorganic impurities present, with a loss not to exceed two pounds pressure. Also these filters have efficient means for inducing coagulants in any desired quantity, and means by which they can be thoroughly washed by reversing the current in a direction opposite to the normal flow. With such a large capacity, being about two and one-half times greater than the probable daily consumption, and such a low pressure, there should be no objection to the use of Huron river water at any of the points desired by the authorities of Monroeville. I am confident that the Monroeville plant when completed will be far superior to many of the plants in the vicinity, and a source of pride and satisfaction to everybody connected with it.

Yours very truly,

(Signed) PAUL VOORHEES,
Engineer.

One deep well for gas has been bored in the neighborhood. It was reported to me that it affords no indications that a sufficient supply of water could be obtained from deep wells.

Samples of water for analysis were collected at the three points marked "A," "B" and "C." The chemist reports as follows:

"A" Huron river just above Jackson creek.
"B" Huron river at Gus Hess's.
"C" Huron river just above dam.

Parts per 100,000.

	"A"	"B"	"C"
Color	.3	.3	.3
Turbidity	none	none	none
Sediment	slight	slight	slight
Odor	none	none	none
Oxygen required	.472	.488	.524
Free ammonia	.0044	.0056	.0062
Albuminoid ammonia	.0168	.0176	.0228
Nitrogen as nitrites	.0011	.0012	.0015
Nitrogen as nitrates	.0197	.0206	.0214
Chlorine	.756	.784	.798
Total solids	52.0	51.2	50.4
Temporary hardness	17.7	17.3	16.8
Permanent hardness	12.6	12.8	12.5

These figures show the samples to be of a river water of very ordinary quality, not fit in its present condition for domestic purposes. The difference in the three samples is slight, but sufficient to show a progressive deterioration, "A" being the best and "C" the poorest. The difference is, however, hardly sufficient to recommend either to the exclusion of the rest. All are poor enough.

(Signed) CURTIS C. HOWARD.

Location "A" in my opinion, affords the best one of the three points noted for taking water from the river. The expense, which is quite an item to the village, will be somewhat increased, the engineer states, by going to this location. It is not a favorable place for an electric light plant. Location "B," with proper filtration of the water, would doubtless afford a safe supply. I would recommend that location "A" or "B" be approved, subject to the conditions (a) that the water shall be filtered in a manner satisfactory to the State Board of Health; (b) that the slaughter house on the river above "A" shall be removed to a place where it cannot contaminate the water supply; (c) that an ordinance be adopted by the village council prohibiting house drainage, drainage from any barn yard, hog pen, or other source of water pollution being discharged into the creek or run previously referred to, said provision (c) not to apply if location "A" is selected as a source of water supply; and (d) that if location "B" is selected, no street, surface or other kind of drainage shall be permitted to be discharged into the Huron river above that point, all of these conditions to be complied with before the water is turned into the mains for public use.

At the same time I would recommend that, before deciding upon the river as a supply, a search should be made by the authorities for a supply of ground water, which, if found pure and in abundance, would be much cheaper and in every way more satisfactory than the river supply.

Very respectfully,

C. O. PROBST,
Secretary.

Ohio State Board of Health,
Office of the Secretary,
Columbus, October 11, 1897.

To the Village Council, Monroeville, Ohio.

Sirs: The State Board of Health has considered your application for approval of a public water supply for your village to be obtained from the west branch of the Huron river at points "A," "B" or "C," as shown on the accompanying map furnished by your consulting engineer.

You are hereby notified that the proposed water supply taken from the river at "A" or "B" has been approved, subject to the conditions enumerated in the Secretary's report, a copy of which is enclosed herewith.

Respectfully,
(Signed) C. O. Probst,
Secretary.
By order of the Board.

REPORT ON THE PROPOSED WATER SUPPLY FOR SABINA.

To the State Board of Health:

Gentlemen: The council of Sabina requested me to advise them in reference to the location of wells for a public water supply. I visited the village July 20, 1897, and with the council and engineer, viewed several pieces of land on which option had been secured. All of these were within corporate limits and not far from inhabited houses.

I advised the council to find a suitable location for the wells outside the village. One test well was bored south of, and just beyond the village, without finding much water. Without further investigation three wells were started on a lot in the village, in size 150 by 194 feet. Water is found at a depth of about eighty-four feet, the wells being bored to about ninety-eight feet. The soil is clay and shale to the limestone, which is about sixty-three feet from the surface. Water is found in this layer of limestone. Beneath the limestone, at a depth of 112 feet, shale is again found. A three inch well ninety-two feet deep is 100 feet from one of the new wells, and has furnished water for many years. When the new well was being drilled this three inch well became quite roily. It was stated that an artesian well, a mile or more away, stopped flowing while the new well was being pumped. There are stock yards near the wells, and a privy vault not far from one of them.

The three wells were pumped with deep well pumps for twenty-four hours at a rate of 200 gallons per minute, or 288,000 gallons per day. The water in the three inch well referred to above, was lowered to forty-two feet from the surface. To get a sufficient amount of water it will be necessary, so the engineer states, to construct a receiving well and use deep well pumps; or to lower the horizontal pumps fourteen feet below the surface. There would be very great objection to a receiving well on account of the surroundings, as it would be extremely difficult to protec it against pollution.

Samples of water from the wells were secured and submitted to Professor Lord for examination. His report is as follows:

COLUMBUS, OHIO, August 26, 1897.

DR. C. O. PROBST, Secretary:

MY DEAR SIR: Following are results of analysis of two samples of water marked "Sabina well, No. 1," and "Sabina well, No. 2:"

	No. 1.	No. 2.
Color	0.1	0.05
Turbidity	Distinct	Distinct.
Sediment	Very marked	Marked.
Odor	Faint earthy	Slight sour.
Oxygen required	0.64	0.30
Free ammonia	.1758	.1784
Albuminoid ammonia	.0056	.0034
Nitrogen as nitrates	None	None.
Nitrogen as nitrites	Faint trace	None.
Chlorine	0.80	0.85
Temporary hardness	35.0	34.4
Permanent hardness	4.2	4.4
Total solids	89.0	70.5
Loss on ignition	9.0	9.0

These samples are both very high in free ammonia and oxygen required and low in albuminoid ammonia and nitrates. Under these circumstances it is probable that most of the ammonia is derived from the reduction of nitrates, and in a very deep well might pass, provided examination of the locality showed no danger of surface infiltration. The oxygen required, however, indicates the presence of much organic matter, and the trace of nitrites in No. 1 indicates that the reduction is barely complete.

Under these circumstances, I should condemn the water as unsafe on account of the high "previous sewage contamination" from a source probably not very remote.

Very respectfully,

(Signed) N. W. LORD.

Considering the depth, location and surroundings of these wells in connection with the report of the chemist, I have to recommend that the proposed water supply for Sabina be disapproved.

Respectfully,

C. O. PROBST,
Secretary.

OHIO STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
COLUMBUS, August 30, 1897.

MR. A. DOWDEN, Mayor, Sabina, Ohio:

DEAR SIR:—The State Board of Health has considered the application for approval of the proposed source of water supply for the village of Sabina and has voted to disapprove of the same.

I send enclosed a copy of the report, and of the chemist's analysis as submitted to the Board.

Yours truly,
(Signed) C. O. PROBST,
Secretary.

By order of the Board.

SECOND REPORT ON PROPOSED WATER SUPPLY FOR SABINA.

To the State Board of Health:

GENTLEMEN: The Board voted to disapprove the water supply proposed for Sabina, to be obtained from certain wells not properly located.

Another location for wells has been selected, a test well bored, and approval is now asked of this source of supply. Two acres of land on the eastern boundary of the village have been secured by option. There are streets on two sides of this tract of land, the B. & O. railroad track on one side and the township line on the other. There are but few houses in its vicinity, and none nearer than 500 feet. A test well was bored, showing the following formation from above downward, as reported by the driller:

Yellow clay	10 feet
Blue clay	22 feet.
Cemented gravel	7 feet.
Blue clay	10 feet.
Blue and grey gravel	12½ feet.
Grey limestone	43½ feet.
Blue limestone	20 feet.
Blue and grey limestone	12 feet.
Shale	3 feet.

A weak vein of water was found at 80 feet and strong veins at 90 and 133 feet respectively. At 135 feet sulphur water was found. The well is 6 inches in diameter, and is cased to a depth of 61 feet. No conclusive pumping tests have been made; but the well was pumped at a rate of about 72,000 gallons per 24 hours, the water remaining constant at 26 feet from the surface. A sample of water was collected, and has been examined by Prof. Howard, who reported as follows:

COLUMBUS, October 13, 1897.

DR. C. O. PROBST, Secretary of the State Board of Health:

DEAR SIR: The two samples of water recived from Sabina have been submitted to a sanitary analysis with the following results:

	*No. 1.	†No. 2.
Color.	.3	.1
Turbidity	very slight.	none.
Sediment	slight.	very slight.
Odor	none.	none.
Oxygen required	.116	.200
Free Ammonia	.1688	.0568
Albuminoid Ammonia	.0012	.0044
Nitrogen as nitrites	.0002	.0240
Nitrogen as nitrates	.0346	.2412
Chlorine	1.19	3.69
Total solids	61.3	66.9
Temporary hardness	35.9	36.2
Permanent hardness	10.8	11.1

---

*1. Well No. 1.
†2. Public well on Howard street.

A knowledge of the source of these samples is essential in the formation of a valuable opinion as to their quality. While they differ considerably in their organic constituents, the similarity in their mineral constituents suggests a possible common origin. If the high free ammonia in each can be explained on the grounds which justify us in believing that it does not represent recent decomposition of nitrogenous matter. No. 1 might be regarded as a usable water, but the large amount of nitrogen as nitrites and nitrates in No. 2 must cause a grave suspicion as to the purity of this sample.

Yours respectfully,

(Signed) CURTIS C. HOWARD.

I would recommend that the proposed water supply of Sabina be approved, with the suggestion that before purchasing the land another well should be drilled, and a thorough pumping test be made to show the probable quantity of water available.

Respectfully,

C. O. PROBST,
Secretary.

OHIO STATE BOARD OF HEALTH.
OFFICE OF THE SECRETARY,
COLUMBUS, October 23, 1897.

To the Village Council, Sabina, Ohio.

Dear Sirs: The State Board of Health has considered your application for approval of a water supply to be obtained from deep wells located at the eastern part of the village, and you are hereby notified that said supply has been approved

I will send you a copy of the report on the proposed supply, including a repor of the chemist's examination; and also a report upon the Howard street well, which indicates that this well is polluted and that its use should be prohibited.

Yours truly,

(Signed) C. O. PROBST,
Secretary.

By order of the board.

REPORT ON THE PROPOSED WATER SUPPLY FOR SHELBY.

To the State Board of Health :

GENTLEMEN : Application having been made by J. C. Fish, superintendent of the Shelby Water Works Company, for the approval of a water supply proposed for that village, I made an inspection of the source of the supply on September 25, 1896.

I was informed that the company had been hunting for water for nearly a year, having spent about four thousand dollars in the search, putting down a number of wells. The map which accompanies this report will show the location and depth of these test wells. None yielded a sufficient quantity of water for a public supply.

Finally the Wagner Steam Filter Well Company, of Dayton, Ohio, undertook to find sufficient water, and put down twelve eight-inch wells thirty-eight to forty-five feet deep. After testing these wells the Wagner Company entered into an agreement to furnish one and a half million gallons of water per day.

These wells are located in a ten-acre field at the edge of the village, and are from two to three hundred feet distant from Black Fork Creek. The land at this point is a little lower than the general level of the town, and in one or two of the test wells, at considerable depth, leaves and twigs are found, indicating an ancient swamp. The soil is loam over a rather thin layer of clay, which is underlaid with sand and gravel. The house nearest to the wells is about 1,000 feet distant. Black Fork Creek carries some sewage from the village, but the wells do not, in all probability, get water from the creek. No other source of pollution of the wells was visible.

The direction of the movement of the ground water was not positively determined, although some information was obtained on the subject, which seems to show that the water which reaches the wells does not pass under the village.

A sample of the water was collected for examination, being taken from one of the wells which was pumped a short time with a hand pump. The jug containing this sample was broken in transit, and another sample, taken with proper precautions, was sent on October 5th. The examination was made by Prof. N. W. Lord, whose comment on the water (combined table is given later) was : "The water was turbid, depositing considerable sediment. The ammonias, oxygen required and chlorine, indicate organic matter in considerable amount." Thinking it possible that pumping the wells for a considerable period with a steam pump might furnish water showing a different result, I requested the water-works company to send another sample, and, after pumping, such a sample was sent October 19th, and was examined the next day by Prof. Lord.

Commenting on this sample the chemist reports : "This water is very high in free ammonia, rather high in albuminoid ammonia, pretty well up in oxygen required. The water is a suspicious water. I should suspect it of containing animal sewage well fermented but *not* exposed to oxidation. The practical absence of nitric acid may mean, however, that the free ammonia is largely due to nitrates entirely reduced to ammonia by working through soil and rock containing reducing agents, possibly sulphides. This is theory, however, and a full investigation of these features would be necessary before this water could be considered safe, as the analysis, on the face of it, condemns it. This latter theory would be supported by the large amount of sulphates (permanent hardness)."

The results of chemical examination of this water supply cast such doubts upon its purity that I hesitated to recommend its approval, although opportunities for specific pollution of the supply seemed to be absent. A consultation was held in Columbus, November 13th, with the superintendent of the water company, the consulting engineer and the chemist, and it was arranged (at the company's expense) to have the chemist and a bacteriologist visit Shelby and make an examination of the company's wells and of private wells in the neighborhood Accordingly, on November 21st, I met Prof. N. W. Lord, Dr. A. M. Bleile and Mr. John P. Force, in Shelby, and a series of bacteriological and chemical tests (for chlorine) were made.

Following is the report of the chemist, including examination of former samples from the waterworks well, and also the report on the bacteriological examination:

COLUMBUS, November 30, 1896.

Dr. C. O. PROBST, Secretary Ohio State Board of Health.

MY DEAR SIR: On October 26th I reported the analysis of a sample of water from the well of the Shelby Water Company. The analysis showed so large a per cent of "free ammonia" that I consider it unsafe unless investigation should show the ammonia was derived from harmless sources.

On November 21st I went to Shelby and made chlorine determinations in a number of wells, and secured a new sample of water from the well: Also a sample of water from the well of Mr. Davis, situated about 4,000 feet from the water works well, and probably entering the same water bearing stratum.

The chlorine determinations were as follows: Waterworks well, 2.10: Davis well, 2.05; Post well, 12.10; Skiles well, 0.50; Barga well, 7.50; Camp well, 0.40; Ott well, 1.90; Doty well, 8.85; Smiley well, 11.20. Samples of water were also examined from the creek both above and below the entrance of the ditch conveying the water pumped from the waterworks well as well as from the ditch itself. Following are these results: Ditch, 2.10; Creek, above, 0.50; Creek, below, 0.85. The analysis of the waterworks water and that of the Davis well are as follows:

	Waterworks well.			Davis well.
	Sample, Oct. 7.	Sample, Oct. 20.	Sample, Nov. 21.	Sample, Nov. 21.
Oxygen required	0.24	0.18		
Free ammonia	0.124	0.076	0.062	0.0025
Albuminoid ammonia	0.027	0.0089	0.010	0.0056
Nitrous acid	none	none	none	0.016
Nitric acid	0.05	trace	none	0.40
Chlorine	2.63	2.01	2.10	2.05

To represent more fully the relation of these figures I have made a sketch of the ground from a blue print map furnished by the engineer, Mr. Force, and shown by lines the distances of the various wells examined from the waterworks well.

As the exact location of the wells was not given on the map the distances are only approximate but probably are not far from correct.

A careful examination of these figures as located on the sketch seems to me to justify the following conclusions. The surface water in the wells, all of which are represented as shallow, not extending forty feet in any case, may reach a minimum of 0.40 chlorine; but many of the wells (Barga well, Doty well, Smiley well, Post well) are heavily contaminated with animal sewage filtered through the soil. Surface conditions fully justify this conclusion, which is based upon the excessive amount of chlorine they contain. The relative depth of these wells renders it probable that their water diffuses into the gravel which is the source of the waterworks water, but the distances are such as to render it extremely improbable that any actual danger can exist from specific infection.

The low chlorine of the creek water again renders it improbable that it forms any large factor in the waterworks supply. The Davis well, however, furnished the most important information.

It seems probable it reaches the same water as that taken by the waterworks well It shows nearly identical chlorine, as does the Ott well, also reaching the same water layer, but differs entirely in its ammonias and also in its *nitric acid* of which it contains 0.40 while the water-works well contains *none*.

This taken with the fact that the waterworks water contains a notable amount of iron carbonate or sulphate in the ferrous or reduced condition, so much that on exposure to air, it rapidly grows turbid and deposits a red sediment of iron oxide, leads to the conclusion that the ammonia in the waterworks water is not derived from animal contamination of recent character, but is due to the reduction of nitrates in the deeper layers of the soil, and is in so far like a " deep well water."

In passing upon the water, I should say in conclusion, that I regard the water as essentially surface or shallow well water, showing evidence of previous sewage contamination to a small extent, which has, however, been first oxidized to nitrates and then reduced to ammonia; it is therefore, at present, safe water, but its surface origin would make it particularly sensitive to the encroachments of sewage, cesspools, or any similar source of contamination liable to come with increased population and overtax the present system of natural filtration. Such dangers can be avoided by keeping the land clear and proper sewerage.

The creek might easily become a source of danger, and should be diverted unless all sewage was turned into it well below the pumping station. The variation in chlorine shown in the analysis of Oct. 7th and Nov. 21st, is suggestive of the surface origin of this element.

Very respectfully yours,

(Signed) N. W. Lord.

Dr. C. O. Probst, Secretary State Board of Health:

Dear Sir: Following is the result of the bacteriological examination of waters taken at Shelby, Ohio, by me, November 21st:

The samples were all plated at the wells in agar, and these plates were subsequently kept in incubator.

1. Water taken from "Davis" well, was sterile.
2. Water taken at waterworks well; one plate was sterile; the second plate gave a single colony, more than likely of adventitious origin.
3. Water taken from "Ott" well, was sterile.
4. Water taken from "Skyles" well, gave sixty-six colonies per c. c.

5. Water taken from "Smiley" well, gave twenty colonies per c. c., and a large number of anaerobies but none of the forms found, indicated fecal contamination.

From the above examination, none of these waters could be regarded as seriously polluted, except perhaps, that from the "Smiley" well.

Respectfully submitted,

(Signed) A. M. BLEILE.

I have located as accurately as possible, on the blue print map, which accompanies the report, the wells which were examined.

It will be noted, that the waterworks well was sterile, and that a satisfactory lanation of the "free ammonia," seems to have been found.

An engineer has been engaged to make plans for sewerage and sewage disposal for Shelby, which will relieve the creek near the wells of all sewage. The waterworks company has expressed a willingness to purchase sufficient land to avoid any additional sources of contamination of the water supply.

Exacting this agreement, and taking into consideration the fact, that a sufficient quantity of water is not available elsewhere, I respectfully recommend that the proposed source of water supply for Shelby, be approved.

Respectfully,

C. O. PROBST,
Secretary.

STATE BOARD OF HEALTH.
OFFICE OF THE SECRETARY,
COLUMBUS, January 5, 1897.

MR. J. C. FISH, Superintendent of the Shelby Water Company, Shelby, Ohio.

DEAR SIR: The State Board of Health has considered your application for approval of a public water supply to be obtained from twelve or more Wagner steam filter wells located at the edge of the village near Black Fork Creek.

Bacteriological examinations made of samples of the proposed supply show it to be entirely free from bacteria, and the chemical analysis indicates a water free from present pollution, but the board would view with much apprehension any encroachment on the space, now free from sources of contamination, which surrounds the well. It also considers that it would be advisable, in order to avoid chances of future contamination of the water supply, that all sewage should ultimately be diverted from Black Fork creek, and that a complete sewage system should be established as soon as practicable.

The proposed supply has been approved, of which you are hereby notified, subject to the condition that sufficient land adjoining the land upon which the wells are located be purchased to avoid any additional sources of contamination of the supply, this approval to remain null and void until this condition has been complied with.

Respectfully,

(Signed) C. O. PROBST,
Secretary.

By order of the Board.

APPROVAL OF A PUBLIC WATER SUPPLY FOR THE VILLAGE OF WAUSEON.

Ohio State Board of Health,
Office of the Secretary,
Columbus, June 5, 1897.

To the Board of Water Works Trustees, Wauseon, Ohio.

Dear Sirs: The State Board of Health has considered your application for the approval of a public water supply to be obtained from wells one hundred feet deep or thereabouts, located in gravel about one and a half miles in a southerly direction from the village of Wauseon, and you are hereby notified that the said supply has been approved. I enclose a copy of the chemist's report on sample of water taken from one of the wells.

Yours truly,

(Signed) C. O. Probst,
Secretary.

By order of the Board.

Columbus, Ohio, May 20, 1897.

Dr. C. O. Probst, Secretary Ohio State Board of Health, City.

My Dear Sir: Following are the results of the analysis of the samples of water from Wauseon:

	Parts per 100,000.	
	Public water supply.	Well Fulton St.
Oxygen required	0.16	0.16
Free ammonia	0.0384	0.0286
Albuminoid ammonia	0.0056	0.0048
Nitrous acid	none	none
Nitric acid	none	none
Chlorine	16.40	7.90
Total solids	59.0	55.0
Volatile solids	6.0	4.0
Hardness by soap	10.7	7.5
Alkalinity as carbonate of lime		38.2

A qualitative test showed the almost complete absence of sulphuric acid. The two samples are very high in free ammonia and chlorine. The almost entire absence of sulphates is remarkable. The entire absence of nitrates would indicate the possibility that the ammonia was derived from nitrates previously existing and reduced by organic matter. The oxygen consumed and the albuminoid ammonia are both low. The high chlorine is very suspicious, especially as it is so different in the two samples. If the water is from shallow wells the figures indicate water derived from a badly polluted ground probably containing peaty materials and should be condemned. It seems hard to understand a deep well so low in sulphates, but if the waters come from deep wells the high chlorine might be mineral, though in this case it ought to be more uniform. I should regard both waters as suspicious.

Very respectfully,

(Signed) N. W. Lord.

REPORT OF PROPOSED WATER SUPPLY FOR WEST ALEXANDRIA.

To the State Board of Health:

GENTLEMEN: On the 9th of August I inspected the location of a well from which it is proposed to take the water supply for West Alexandria, a place of about one thousand inhabitants, in Preble county.

There is one drilled well which it is thought will furnish a sufficient quantity of water for the present. If not, it is proposed to sink others near by. It is within the corporate limits of the village but is several hundred feet from the nearest house. The general surface of the ground in and around West Alexandria is level, the highest part of the village, a quarter of a mile distant, being but five or six feet higher than the top of the well. The well is tightly cased to the water-bearing stratum, and the strata through which it is sunk are as follows:

Clay	9 feet
Gravel	14 feet
Blue clay	22 feet
Gravel	9 feet
Clay and sand mixed	8 feet
Soft blue mud	2 feet
Blue clay	23 feet
Gravel	6 feet
Total	93 feet

Below this lower stratum of gravel is a stratum of blue clay into which the well was sunk about ten feet, but believing that the gravel above would furnish water in sufficient abundance and purity, the case was drawn out of the blue clay and pumping begun. At first the water was turbid, but after pumping a few hours it became clear.

At the time of my visit the well had not been pumped for several days, and when the pump was started the water was turbid, presenting the appearance of an admixture with blue clay. After pumping for a few hours the color is almost entirely lost. The only sediment that I noticed was a small amount of fine sand that found its way through the screen at the bottom of the tubing. I have no doubt more prolonged pumping will diminish the amount of turbidity and sediment.

The chemist's report is as follows:

COLUMBUS, OHIO, August 26, 1897.

DR. C. O. PROBST, Secretary.

MY DEAR SIR: Following are results of analysis of two samples of water from West Alexandria, marked No. 1 and No. 2:

	No. 1.	No. 2.
Color	0.1	0.1
Turbidity	slight	slight
Sediment	marked	marked
Odor	faint musty	faint musty
Oxygen	0.17	0.23
Free ammonia	.1166	.1104
Albuminoid ammonia	.0026	.0034
Nitrogen as nitrates	none	none
Nitrogen as nitrites	none	none
Chlorine	0.80	0.80
Temporary hardness	29.2	28.8
Permanent hardness	none	none
Total solids	40.5	40.5
Loss on ignition	5.5 .	5.5

The samples are practically identical, both excessively high in free ammonia though low in albuminoid ammonia. The high free ammonia probably comes from the reduction of nitrates by organic matter or sulphates, and if the water comes from a well of sufficient depth to assure complete filtration from all active germs it might pass, but the amount of ammonia is so large as to indicate that the source was originally highly polluted, and if the wells are not very deep and certainly protected from surface filtration I should condemn the water as "suspicious" owing to high previous sewage contamination.

Yours very respectfully,
(Signed) N. W. LORD.

While the chemist's analysis does not show this to be an ideal water, it may, I believe, be regarded as a satisfactory one when we consider the locality and character of the strata through which the well is sunk.

I would therefore recommend the approval of this proposed source of water supply for West Alexandria.

Respectfully submitted,
BYRON STANTON,
Committee.

OHIO STATE BOARD OF HEALTH.
OFFICE OF THE SECRETARY,
COLUMBUS, September 1, 8197.

MR. E. W. WAMPLER, Village Clerk, West Alexandria, Ohio.

DEAR SIR: The State Board of Health has considered your application for approval of a water supply to be taken from a driven well in the corporate limits of your village, and has voted to approve the same.

I send you enclosed a copy of the report of Dr. Stanton as submitted to the Board: also a copy of the chemist's report on samples of water.

Yours truly,
(Signed) C. O. PROBST,
Secretary.

By order of the Board.

REPORT OF AN INVESTIGATION OF THE WATER SUPPLY OF WOOSTER.

To the State Board of Health:

GENTLEMEN: The city of Wooster in 1894 appointed a commissión to make an investigation of and report upon an extension of the public water supply of that city. The commission, after about completing its report, called upon your secretary to visit Wooster and inspect the supply it was proposed to recommend.

A report of this investigation may be found on page 69 of the annual report of the State Board of Health for the year 1894. At the time of this first visit of the secretary, Wooster was on the verge of a water famine; and in order to make up the supply, water was being pumped into the mains from Apple creek by means of a traction engine, pump and line of fire hose.

It was represented by the waterworks trustees that this supply was of the most temporary character, used only to meet the great emergency then at hand, and that steps would be taken at the earliest possible time to provide a permanent and pure supply of water.

An inspection of Apple creek, and a chemical examination of its waters, showed this supply to be badly polluted. An examination of the ground water, which the commission recommended as a permanent supply, showed it to be of good quality.

The Water Extension Commission submitted its report to council, but nothing came of it. During each of the three summers following this investigation, Apple creek has been resorted to to increase the supply and this in spite of the protests of many citizens. The traction engine has given place to what can only be regarded as a permanent pumping station.

It will thus be seen that the city of Wooster for three years' time has been making use of a water supply not approved by the State Board of Health, as required by law.

Complaints of the character of the water supply being renewed this year the undersigned visited Wooster on October 12th and investigated the present condition of affairs. We found that Apple creek for some weeks past has been furnishing at least 300,000 gallons of water per day, which is three-fourths of the total supply. The other fourth is taken from a deep well in rock. Apple creek, only a short distance above where water is taken from it, receives the drainage from the gas works, from a brewery and the surface wash from a number of yards. There are also other sources of contamination.

We met the mayor, the superintendent of the waterworks, the health officer, and a number of the waterworks trustees, who accompanied us on our tour of inspection. It was freely admitted that the present supply is unsatisfactory, but the plea was made that there is no available supply of pure water, of sufficient quantity. This plea does not seem to be well founded.

We would recommend that the waterworks trustees be informed that the State Board of Health condemns the use of Apple creek as a source of public water supply, and that needed additional supplies must be obtained from a source approved by said Board, as required by the act relating to public water supplies, passed March 14, 1893.

Respectfully,

JOSIAH HARTZELL,
C. O. PROBST,
Committee.

OHIO STATE BOARD OF HEALTH.
OFFICE OF THE SECRETARY.
COLUMBUS, October 25, 1897.

To the Board of Waterworks Trustees, Wooster, Ohio :

GENTLEMEN: I enclose herewith a report of an investigation of the water supply of Wooster, which was submitted to the State Board of Health at a meeting held October 21, 1897. The report was approved, and I was instructed to notify you that the Board condemns the use of Apple creek as a source of water supply.

Yours truly,

(Signed) C. O. PROBST,
By order of the Board. Secretary.

Sewerage Systems and Disposal Works.

REPORT ON PROPOSED SEWERAGE FOR BLUFFTON

To the Members of the State Board of Health:

GENTLEMEN: On August 28, 1897, I visited Bluffton, Allen county, a village of about 1,500 inhabitants, to inspect their sewerage plans and proposed outlet. The plans are not completed and are given prospectively.

It is proposed to build the combined system and empty the crude sewage into the Big Riley creek, just north of the corporate limits. The plat shows three sewer districts. At present it is proposed to build the sewers in district No. 1, or rather part of No. 1. It is proposed to build the sewer up Jackson street to Washington street, then on Washington street to Spring street, and then north to the creek; the length of the sewer to be about three-fourths of a mile. At this outlet it is to be a three-foot sewer, the size to be gradually reduced. The proposed outlet is well located to take care of the crude sewage by irrigation or any other acceptable plan. The Big Riley creek is a small stream flowing through the village and emptying into the Blanchard river a few miles from Ottawa; and as it is quite probable that Ottawa, as well as several other towns and cities through which the stream flows, will in a few years take its water supply from this stream, it is desirable to keep these streams, that are to be used as a water supply or that are tributaries of such streams, as free from pollution as possible.

It is therefore recommended that some system of purification of crude sewage be constructed in connection with the proposed sewerage plant, and that the emptying of crude sewage into the Big Riley creek be not approved.

Respectfully Submitted,

R. D. KAHLE,
Committee.

OHIO STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY.
COLUMBUS, September 15, 1897.

To the Mayor and Council, Bluffton, Ohio:

SIRS: Your application for approval of a system of sewerage, presented by Mr. B. S. Welty, solicitor for Bluffton, has been considered by the State Board of

Health, and you are hereby notified that the proposed system has been disapproved unless some satisfactory method for purifying the sewage before discharging it into Big Riley creek is made a part of your plans.

Yours truly,
(Signed) C. O. PROBST,
Secretary.

By order of the Board.

DISAPPROVAL OF PLANS FOR ADDITIONAL SEWERAGE FOR BUCYRUS.

OHIO STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY.
COLUMBUS, June 29, 1897.

Mr. E. B. Shifley, City Engineer, Bucyrus, Ohio:

DEAR SIR:—The State Board of Health has considered the application of the city of Bucyrus to approve plans for additional sewerage for that city, the sewage to be disposed of by discharging it into the Sandusky river, and you are hereby notified that, at a meeting of the State Board of Health held June 23, 1897, said plans were disapproved as regards the turning of unpurified sewage into the Sandusky river.

Respectfully,
(Signed) C. O. PROBST,
Secretary.

By order of the Board.

REPORT ON A SEWERAGE SYSTEM FOR CHILLICOTHE.

To the Honorable State Board of Health:

GENTLEMEN: In accordance with the resolution of the city council of Chillicothe, Ohio, hereto attached, I respectfully present a plan for the sewerage of said city together with detailed plans as follows:

Plans for pumping station and reservoirs, filtered beds and gate chambers.

Details of man-holes and flush-tanks.

Details of sewage gates.

Plan of outlet bulkhead of Hickory street sewer and profiles of sewers.

Chillicothe is a city with a population, according to the last Federal census, of 11,256 inhabitants. It is situated on the Scioto river, south of Columbus and about fifty miles north of the Ohio river, into which the Scioto empties at Portsmouth. The topography of the city is peculiar insomuch as along the river the elevation of the surface is for the most part higher than at points more remote. With the exception of a very limited area the land slopes gently to the south, away from the Scioto river and in the direction of Paint creek, which forms a natural boundary to the city on its southerly side. Paint Creek empties into the Scioto river at a point about three miles below the city. Various projects for the sewerage of the city and for the disposal of the sewage have been advocated by citizens and local engineers. I have investigated fully the merits of all these propositions and the result of my investigation as reported to the Board of Sewer Commissioners of the city is herewith respectfully submitted and forms a part of this report. The plan proposed by me and adopted by the Sewer Commissioners as the most feasible one includes the following: The construction of a receiving well and covered reservoirs to be located at the intersection of Eighth street and the canal, into which the sewers from all parts of the city will discharge; the erection of a pumping station, and the installation of boilers and pumps in duplicate; the construction of a cast iron force main from the pumping station to a tract of land amounting to sixty-one and three-fourths ($61\frac{3}{4}$) acres, located south of the city in a loop of Paint creek, where the sewage will be disposed of by intermittent filtration. This tract of land, known as the Moore's farm, is well situated and consists of material well adapted to the purpose for which it has been selected. The surface for a depth ot from two to three feet consists of a sandy loam and clay. Under this material lies a coarse sand, and beneath the sand the material is gravel. It is proposed to remove the surface material and grade the filter beds to the level of the sand. The filter beds, when completed, will be of varying elevations but the lowest ones will be ten (10) feet above the level of mean low water in Paint creek. It is proposed to underdrain the filter beds to a depth of six (6) feet by two lines of eight (8)-inch vitrified pipe laid with open joints through each filter bed. No separation of sludge will be attempted at the receiving reservoir. The area available for filtration after deducting space occupied by embankments amounts to forty-two (42) acres. The land selected is situated about one-half mile from the city limit and is completely isolated, by reason of its location, as will be seen by an inspection of the map.

The sewerage system proposed is a separate, or sanitary one, consisting of vitrified pipe sewers ranging in size from eight (8) inches to thirty (30) inches.

The sizes are so adjusted with reference to the fall obtainable as to furnish capacity sufficient for the sewage of ten (10) persons to every fifty (50) feet of sewer; the amount of sewage *per capita* being taken at one hundred (100) gallons per twenty-four hours, and the sewers to run only one-half full at the time of maximum flow.

The sewers are provided with man-holes at each change of grade or direction, and at intermediate points where the distance is more than five hundred (500) feet. Each lateral sewer will be provided at the summit with an automatic flush-tank, fed from the public water supply, and adjusted to operate once in each twenty-four hours.

Chillicothe is badly in need of sanitary sewerage. It is customary in the residence portion of the city to construct sinks loosely walled up into which the excreta and house slops are discharged, allowing the liquids to soak away through the porous soil to the level of the water table beneath, from whence it finds its way into wells. On the business streets the conditions are, if anything, worse. There vaults are constructed in the rear of business rooms and the contents emptied from time to time at night and transported in open pails through the rooms occupied by stores to carts in the streets. Immediate relief from this deplorable condition is demanded by the sufferers. As it will take at least two years to construct the proposed system of sewers and sewage disposal and arrange it for use, I propose the following temporary expedient for the relief of the business district, until such time as the system is ready for use: By constructing lateral sewers on Water and Main streets, from Mulberry street to Paint street, and connecting them with a sewer to be laid on Paint street from Fourth street to Water street. The Paint street sewer to discharge into a sewer to be laid on Second street from Paint street to Hickory street and to be there finally connected with a sewer to be laid on Hickory street running south and discharging into the receiving reservoir. For the present the Second street sewer to be connected with a storm water sewer to be constructed on Hickory street, discharging into the river. At the point of discharge it is proposed to construct a drop to receive the dry weather flow from the sanitary sewers and conduct it through a cast iron pipe laid below extreme low water level into the river, so that the discharge will be beneath the surface and away from the shore. The river at this point is one hundred and seventy-five (175) feet wide at the low water line, the depth varying from two (2) to five (5) feet. The total area of a cross-section taken at right angles to the axis of the stream at low water is 613.95 square feet. The flow at such times is approximately 79,000,000 gallons in twenty-four hours. There are no dwellings erected along the river bank below the proposed sewer outlet. The river bank has been used for years as a dumping ground for dry garbage. The sewers proposed to be discharged into this temporary outlet are here tabulated, together with the estimated amount of sewage to be contributed by each.

Street.	From.	To.	Length.	Amount of sewage in 24 hours.
Main	Mulberry	Paint	850 feet	34,000 gallons.
Water	"	"	850 "	34,000 "
Paint	Water	Fourth	1,375 "	55,000 "
Second	Paint	Hickory	1,758 "	35,160 "
Totals			4,833 feet	158,160 gallons.

In computing the amount of sewage to be contributed by the sewers in Main, Water, and Paint streets an allowance was made for twenty persons contributing sewage for each fifty feet of sewer at the rate of one hundred gallons each twenty-four hours, as these streets are thickly populated business streets. No allowance is made for the Hickory street sewer as it is to be strictly a storm water sewer without house connection. Assuming that the whole flow of 158,160 gallons passes off in sixteen hours, then it will be seen that the sewage will form less than three-tenths of one per cent. of the total flow of the river during stages of low water. It is probable that, taking into consideration the fact that the sewage would have to flow over fifty miles to join the Ohio river and from thence many miles further before entering into any water supply, there would be no objection to making this proposed outlet a permanent one; but as it will be impossible for the city to successfully drain any larger area in this direction, and as purification works will be necessary for the treatment of sewage from other districts, it is proposed to unite the sewers under consideration with the main system as soon as the latter is constructed.

I therefore ask in the name of the city council of Chillicothe, for the approval of the plan of sewerage and sewage disposal for the entire city herewith presented, together with permission to establish a temporary outlet at Hickory street into the Scioto river, in accordance with the plans, to dispose of the sewage to be distributed by the sewers named above, until such time as they can be connected with the main system.

Respectfully submitted,
JOHN P. FORCE,
Consulting Engineer.

Cleveland, Ohio, April 8, 1897.

WHEREAS, John P. Force, of Fostoria, has been employed by this body to make a general plan of sanitary sewerage for the city of Chillicothe, Ohio, with detailed plans and specifications for the immediate disposal of sewage of that limited portion of the city which it is at present contemplated sewering:

THEREFORE, Be it resolved by the city council of the city of Chillicothe, Ohio, that the State Board of Health be, and is hereby most respectfully requested to recognize Mr. John P. Force, consulting engineer, of Fostoria, Ohio, as the duly and legally appointed, qualified and acting representative of the city of Chillicothe, Ohio, in the matter of sanitary sewers for said city; and that said State Board of Health is most earnestly and respectfully requested to approve any plan of sanitary sewers which he may present to said Board, if in its judgment the said Board may deem it the wisest and best policy under the existing laws of the state.

Adopted September 21, A. D. 1896.

GEO. L. EMMELL,
President *pro tem.* of City Council.

Attest:
GEO. E. MOSHER,
City Clerk.

CITY CLERK'S CERTIFICATE.

I, Geo. E. Mosher, city clerk of the city of Chillicothe, Ohio, do hereby certify that the foregoing is a true and exact copy of the resolution as passed by the city council September 21, A. D. 1896.

(Signed) GEORGE E. MOSHER,
City Clerk.

OHIO STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
COLUMBUS, May 11, 1897.

Mr. JOHN P. FORCE, Consulting Engineer, Fostoria, Ohio.

DEAR SIR: The State Board of Health has considered your application, made by authority of the council of the city of Chillicothe, to approve plans for a system of sewerage and sewage disposal for said city; with a temporary outlet to the Scioto river at the foot of Hickory street, said outlet to be constructed so as to receive sewage from the following districts only, to-wit:

Main street from Mulberry street to Paint street.

Water street from Mulberry to Paint street.

Paint street from Water to Fourth street.

Second street from Paint to Hickory street, as set forth in your report to the State Board of Health.

You are hereby notified that the plans for sewerage and sewage disposal, as presented by you, have been approved, subject to the provision that the sewage disposal works shall be ready for operation, and the temporary outlet into the Scioto river shall be abandoned, within a period of three years from date.

Respectfully,

By order of the Board. (Signed) C. O. PROBST,
Secretary,

REPORT ON ADDITIONAL SEWERAGE FOR CINCINNATI.

To the State Board of Health:

GENTLEMEN: Having been appointed to inspect and report upon the application of the Board of Administration, of Cincinnati, for permission to construct two portions of a sewer in the ravine along Torrence road to connect three portions of sewer already built, I would present the following report of an inspection made July 7, 1897.

One section of the proposed sewer extends from the intersection of Torrence road and Woodland avenue to a point a few feet north of Columbia avenue, a distance of about twenty-five hundred feet. The other section is about one hundred and ten feet long, between the Little Miami railroad and Eastern avenue. The blue print which accompanies the application shows the portions of existing sewers and the proposed connecting sections. The portion above the intersection of Torrence road and Woodland avenue was a private sewer, built several years ago, but accepted by the city as a part of its sewer system. It receives the surface drainage of a small part of what is known as Obryonville, and probably has some house connections. The effluent, with surface drainage of other parts of Obryonville, makes the small stream in the ravine very offensive, and as it runs very near to a number of houses along Torrence road, it is a nuisance that can only be abated by the completion of the sewer.

As the Board of Administration consents to the conditions that no connections for house drainage, water closets or vaults shall be permitted without the consent of the State Board of Health, and as no additional contamination of the city water supply would result, I would recommend the approval of the plans submitted, subject to the conditions above named.

Respectfully submitted,
BYRON STANTON.
Committee.

OHIO STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
COLUMBUS, July 21, 1897.

MR. A. P. BUTTERFIELD, Clerk Board of Administration, Cincinnati, O.

DEAR SIR: The State Board of Health has considered the application of the Board of Administration of Cincinnati for approval of plans for the construction of two sections of a sewer along Torrence road, to wit: One section to extend from the intersection of Torrence road and Woodland avenue to a point a few feet north of Columbia avenue, and the other from the track of the Little Miami railroad to Eastern avenue.

You are hereby notified that said plans have been approved, subject to the condition that no connections shall be made with said sewer, for the discharge of house drainage, water closets or privy vaults, without the written permission of the State Board of Health.

(Signed) C. O. PROBST,
Secretary

By order of the Board.

REPORT OF EXTENSION OF THE CRAWFISH CREEK SEWER, CINCINNATI.

To the Ohio State Board of Health:

GENTLEMEN: Application having been made to this Board by the Board of Administration of Cincinnati for the approval of proposed plans for the extension of the Crawfish creek sewer for a distance of about 700 feet in Linwood pike, I was appointed to investigate and report upon the matter and respectfully submit the following:

Crawfish creek sewer is built along Delta avenue from the river to Linwood pike. It is the intention of the Board of Administration to improve Linwood pike, and to do so in the best and most economical way, the Board desires to extend the sewer about 700 feet, which is as far as the sewer will occupy the pike. No house or vault connections are to be permitted with the proposed extension, without authority from the State Board of Health.

I would recommend the approval of the proposed extension upon condition that no connections for house drainage, water-closets or vaults shall be permitted without consent of the State Board of Health.

Respectfully submitted,
BYRON STANTON.
Committee.

Cincinnati, January 5, 1897.

OHIO STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY.
COLUMBUS, January 11, 1897.

MR. H. J. STANLEY, Chief Engineer, Board of Administration, Cincinnati, Ohio.

DEAR SIR: The State Board of Health has considered your application of December 22, 1896, for approval of an extension of the Crawfish creek sewer, "from end of existing sewer at Delta avenue to a point about seven hundred and five (705) feet northwardly," and discharging into Crawfish creek.

You are hereby notified that the proposed extension of Crawfish creek sewer has been approved, subject to the condition that no connections for house drainage, water closets or vaults shall be permitted without the consent of the State Board of Health.

Respectfully,

(Signed) C. O. PROBST,
Secretary.

By order of the Board.

REPORT ON SEWERAGE FOR DELPHOS.

To the Ohio State Board of Health:

GENTLEMEN: As a committee, I visited Delphos, May 20, 1897 Delphos is a city of 4,500 inhabitants, situated in the western part of Allen county on Jennings creek.

A few years ago a storm water tile sewer, 18 inches in diameter, was put in on Main street, running north and emptying into Jennings creek. This sewer is about one and one-half miles long and the outlet is about one-half mile north of the city limits. Recently Delphos has put in waterworks and it is now proposed to use this sewer for house drainage. Some connections had been made at the time of my visit. The outlet of this sewer is well located so as to take care of the sewage by broad irrigation. It is probable that for a long time to come the amount of sewage discharged into this creek will be small, and as the water is not used from this stream for domestic purposes, it is recommended that the use of this sewer be permitted until such time as the State Board of Health shall deem it wise to require purification of the sewage.

Respectfully submitted,

R. D. KAHLE,
Committee.

OHIO STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
COLUMBUS, June 29, 1897.

To the Village Council, Delphos, Ohio:

SIRS: The State Board of Health has considered the question of permitting house connections for sanitary drainage to be made with the storm water sewer in

Main street of your village, said sewer emptying into Jennings Creek, and you are hereby notified that the State Board of Health, at a meeting held June 23, 1897, voted to permit such use of said sewer until such time as the said Board shall deem it necessary to require purification of the sewage.

Respectfully,

(Signed) C. O. PROBST,
Secretary.

By order of the Board.

DISAPPROVAL OF PLANS FOR THE SEWERAGE OF GLENVILLE.

At a meeting of the State Board of Health, held in Columbus, Ohio, January 20, 1897, a committee of the council of the village of Glenville presented plans for sewering that village, together with a resolution of the Board of Health of Glenville, given below.

At the same meeting a committee of citizens of Glenville appeared before the Board and presented a petition against allowing crude sewage to be discharged into Lake Erie.

RESOLUTION OF THE BOARD OF HEALTH.

WHEREAS, There has been a large number of complaints, come from residents of Eldridge, Avondale, Ethel and that portion of Robinson avenue, lying south of the Lake Shore and Michigan Southern Railway tracks in said village of Glenville, that large quantities of water is standing in their cellars, and which has become stagnant and manifestly injurious to the public health and safety of the village, and

WHEREAS, The committee of health and cleanliness of this board has examined into said complaints and has filed its report which is made a part hereof. Therefore, be it

Resolved, By the Board of Health of the village of Glenville that by reason of the foul and stagnant water found standing by the Board in nearly every cellar under the greater portion of the dwelling houses located on Eldridge, Ethel, Avondale and that portion of Robinson avenue lying south of the Lake Shore and Michigan Southern Railway Company's tracks in said village, they hereby declare that the stagnant water standing in said cellars, under said dwelling houses, is injurious and a menace to the health and safety of the public of said village, and hereby declare the same to be a public nuisance, and the clerk is hereby instructed to send the council of this village a copy of this resolution, and said council is hereby requested to immediately take the necessary steps to have the same abated, and to furnish said residents proper relief and thus avoid an epidemic in the village.

(Signed) E. SELFE,
Clerk.
WM. JAMES,
President.

Resolution adopted August 4, 1896.

GLENVILLE, OHIO, January 20, 1897.

To the Honorable Body, The Ohio State Board of Health:

The undersigned committee, appointed by the council of the village of Glenville to confer with your honorable body, begs leave to submit the report of our sanitary engineer, Mr. George S. Pierson, for your consideration. Hoping that part of the report of the sanitary engineer, recommending the temporary outlet into Lake Erie, will meet with your approval, we are,

Most respectfully yours,

WM. JAMES, Chairman,
R. C. HOPKIN,
DAVID MORROW,
ALEXANDER S. HENRY,
Committee.

PROTEST.

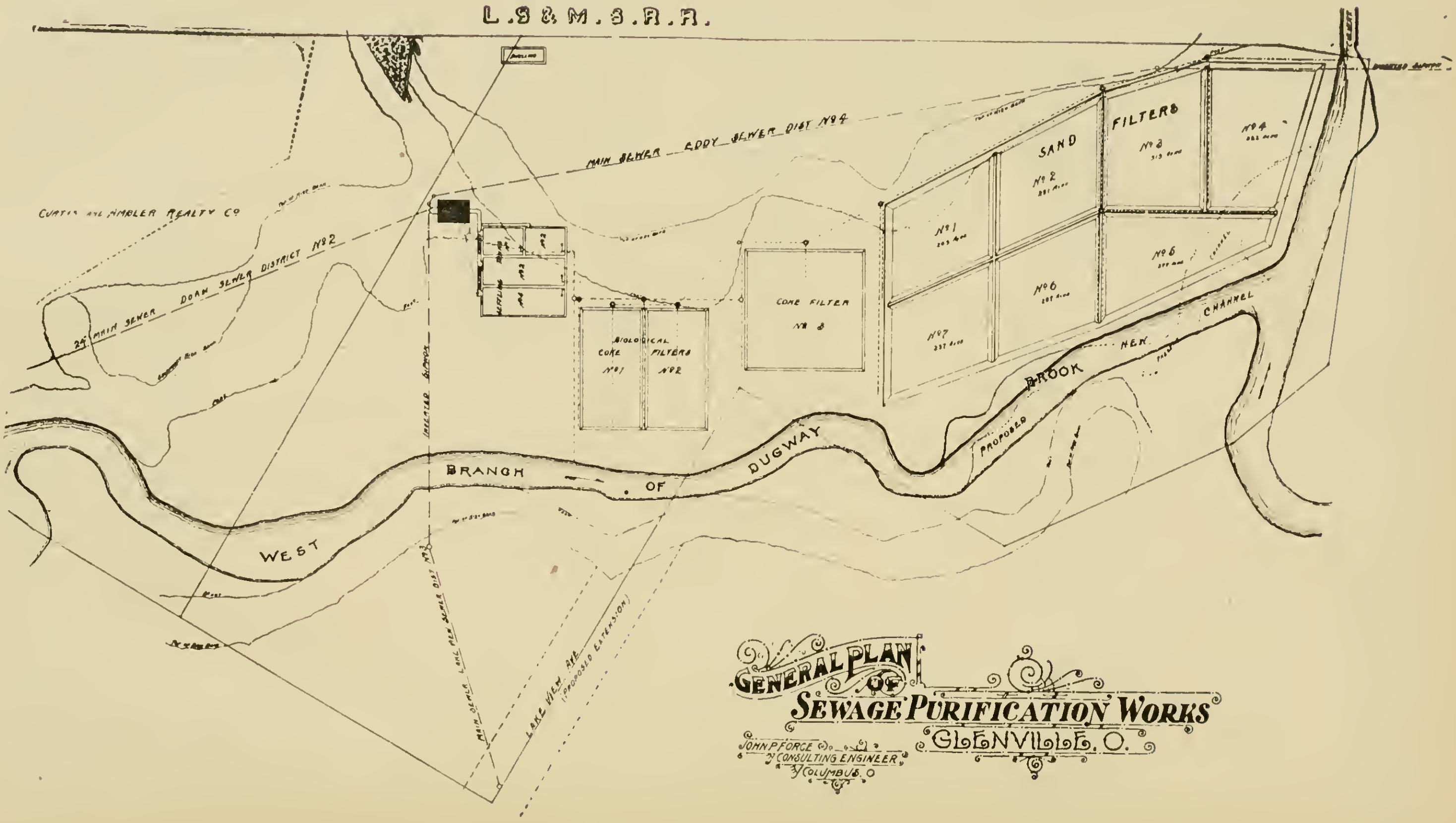
To the State Board of Health of the State of Ohio:

We, the undersigned owners of property in Glenville, Cuyahoga county, Ohio having a frontage upon Lake Erie, respectfully protest against any action of th municipal authorities of Glenville which will cause crude sewage to be emptied into Lake Erie, and especially against the proposition to cause a sewer to be laid in Lewis avenue, terminating in Lake Erie.

We understand that it is claimed that any such arrangement for sewerage will be only temporary; but we believe that even a temporary use of the lake for that purpose will result in destroying the value of our homes fronting upon the lake, and make it not only disagreeable, but unhealthful, to use the shores and waters of the lake as we have been accustomed to do.

We therefore beg your honorable body to take such action and make such order as shall prevent the use of Lake Erie as a receptacle for the sewage of Glenville.

John F. Whitelaw, President of the Country Club Company, 133 members.
T. H. Goff.
S. P. Haldeman.
S. P. Haldeman, executor L. Haldeman estate.
J. P. Hogan.
S. P. Benedict.
W. H. Coming.
Flora S. Mather.
L. E. Walton.
Sarah C. H. Robinson, by Frank DeH. Robinson.
F. P. Root.
Mary Payne Bingham, by Samuel Williamson, her attorney.
Estate of Charles H. Bulkley, by Samuel E. Williamson, its attorney.
Samuel E. Williamson.
Margarita P. Cutter, by William E. Cushing, her attorney.
S. Pentland.
Delia E. Holden.
J. H. Saulsbury, by L. E. H.
The Board of Park Commissioners, by L. E. Holden, as authorized.

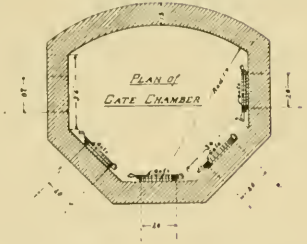

L.S.&M.S.R.R.
MAIN SEWER EDDY SEWER DIST Nº 4
CURTIS AND HAMLER REALTY Cº
24" MAIN SEWER DOAN SEWER DISTRICT Nº 2
SETTLING TANKS
Nº 1
Nº 2
Nº 3
Nº 4
BIOLOGICAL COKE FILTERS Nº 1 Nº 2
COKE FILTER Nº 8
SAND FILTERS
Nº 1
Nº 2
Nº 3
Nº 4
Nº 5
Nº 6
Nº 7
PROPOSED NEW CHANNEL
BROOK
WEST BRANCH OF DUGWAY
MAIN SEWER LAKE VIEW SEWER DIST Nº 3
LAKE VIEW AVE (PROPOSED EXTENSION)

GENERAL PLAN OF SEWAGE PURIFICATION WORKS GLENVILLE, O.

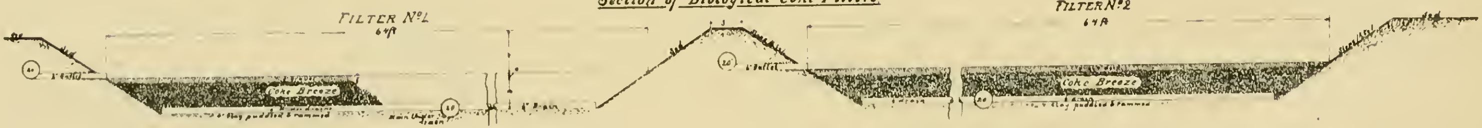
JOHN P. FORCE
CONSULTING ENGINEER
COLUMBUS, O.

Details of Sewage Purification Works,
Glenville, Ohio.

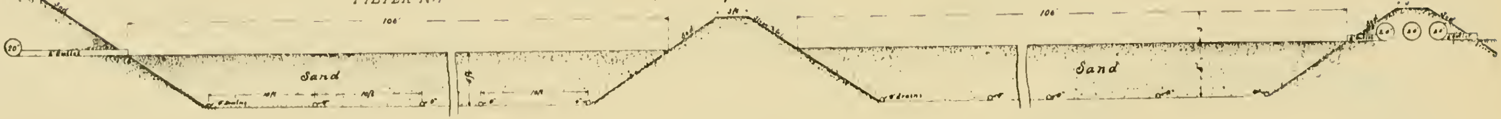
John P. Force Jr.
Consulting Engineer
Columbus, O.

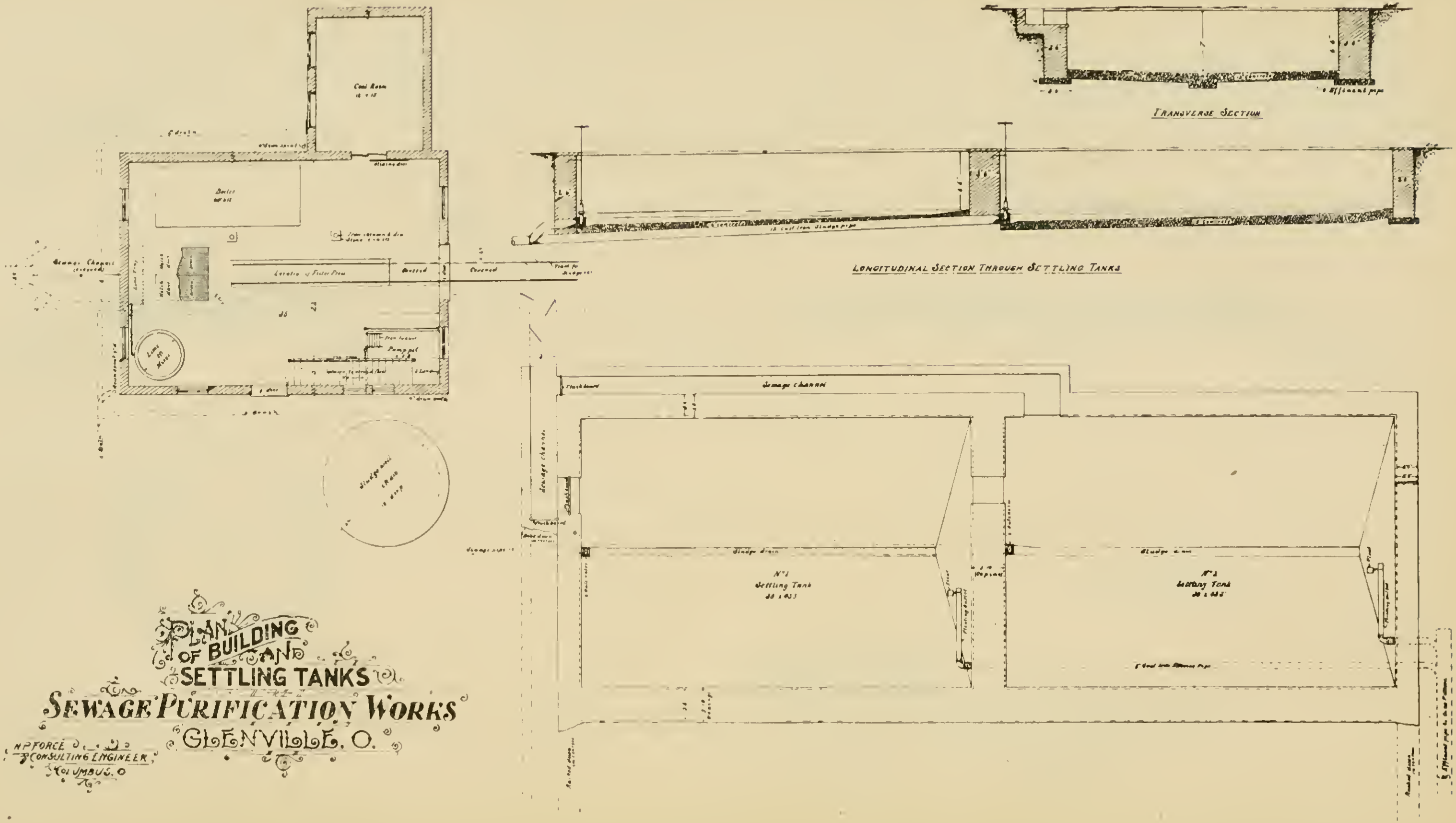


Section of Biological Coke Filters.



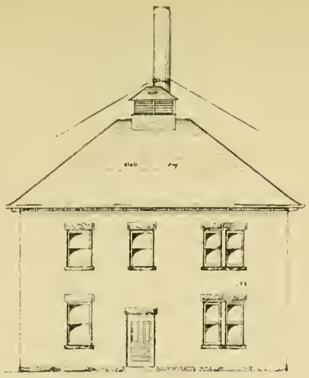
Section of Sand Filters.

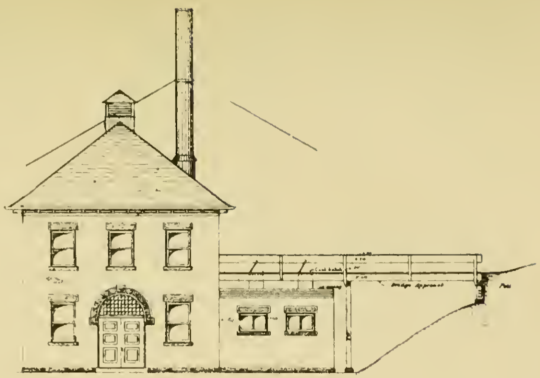




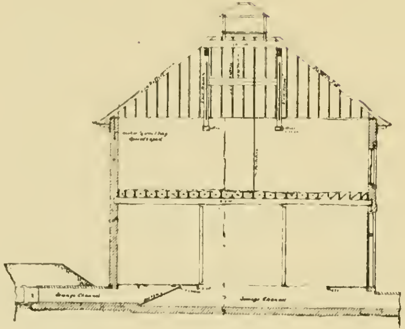
PLAN OF BUILDING AND SETTLING TANKS
SEWAGE PURIFICATION WORKS
GLENVILLE, O.

H. P. FORCE,
CONSULTING ENGINEER,
COLUMBUS, O.

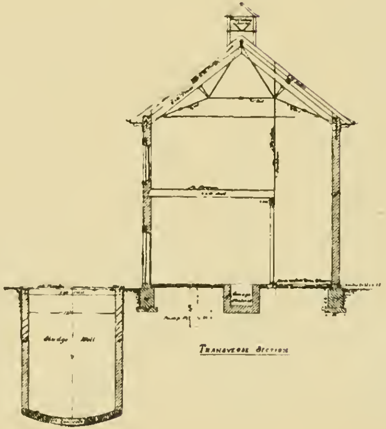

SIDE ELEVATION.



FRONT ELEVATION.



LONGITUDINAL SECTION.



TRANSVERSE SECTION.

Elevations & Sections of Building,

Sewage Purification Works,

Glenville, Ohio.

Ohio State Board of Health,
Office of the Secretary,
Columbus, January 29, 1897.

Mr. Wm. James,
Mr. R. C. Hopkins,
Mr. David Morrow,
Mr. Alexander S. Henry,
} Committee of Council.
Glenville, Ohio.

Dear Sirs: The State Board of Health has considered your application for approval of a system of sewerage for the village of Glenville, as planned by Mr. George S. Pierson, engineer, and providing for a temporary outlet into Lake Erie, and you are hereby notified that the plans have been disapproved. This applies only to the proposed outlet for crude sewage into Lake Erie.

The Board is of the opinion that the discharge of sewage at the point indicated in the plans would not be without danger to the water supply of the city of Cleveland, and for this reason should not be allowed.

It is suggested that it is possible to so purify the sewage, and at a reasonable expense, as to remove this objection, and the Board will be pleased to render you every possible assistance in selecting the best method for accomplishing this end.

Respectfully,

(Signed) C. O. Probst,
Secretary.

By order of the Board.

REPORT ON A SYSTEM OF SEWERAGE AND SEWAGE PURIFICATION FOR GLENVILLE.

At a meeting of the State Board of Health, held in Cleveland, Ohio, June 23, 1897, Mr. John P. Force, consulting engineer for the village of Glenville, presented plans, and the following report upon a system of sewerage and sewage purification for that village:

To the Honorable Village Council, Glenville, Ohio:

Gentlemen: In accordance with a resolution passed by your honorable body March 29, 1897, employing me to prepare plans for a system of sewerage and sewage disposal for the village of Glenville, I herewith respectfully submit plans as follows:

A map of the village, drawn to a scale of four hundred feet per inch, showing all streets, upon which are shown the location of proposed main and lateral sewers, together with the location of man-holes and flush tank.

Detail drawings of a man-hole and flush tank.

Detail drawings of man-hole cover, steps and dirt pan.

Nine sheets of profiles of streets, showing the elevation of the surface, and the elevation and rate of grade of proposed sewers, together with the location of man-holes and flush tanks.

A general plan of the proposed sewage purification works.

Detail drawings of settling tanks, filters, building, etc.

Specifications for the work, and an estimate sheet of proposed sewers in Doan Sewer District, giving approximate quantities of excavation and material required, together with the estimated cost of each sewer in the district.

As you have already received excellent reports upon the subject of sewerage for your village from Mr. J. F. Brown, C. E., and Mr. Geo. S. Pierson, C. E., in which the general topographical conditions were described in detail, and the several systems of sewerage in general use were discussed and explained, I will not enter into a discussion of these points, except where necessary for a more perfect understanding of the system proposed.

After careful investigation of the conditions existing at present in your village, and with due regard to the probabilities of the future, I concur with these gentlemen in their conclusions as to the system of sewerage best suited to your requirements.

The system of sewerage proposed, therefore, includes what is generally known as a "sanitary" or separate system of sewerage for the prompt removal of all liquid household wastes, together with a system of sub-drains, to be laid in the same trench with the sewer proper, for the removal of sub-soil water.

The natural advantages possessed by your village for the comparatively inex pensive removal of storm water by gutters, and short lines of storm sewers discharging into the several streams flowing through the village, would suggest the removal of sewage proper by a special system of sewers designed for this purpose only. But there is another factor in the problem which has even greater effect in determining its final solution.

The action of the Ohio State Board of Health in refusing to approve a plan of sewerage for the village by which the discharge of crude sewage into Lake Erie was contemplated, renders the purification of the sewage necessary before its final discharge into the lake, or into any stream flowing through the village.

The discharge from a combined system of sewers is extremely difficult to handle in purification works. Fluctuating as it does from the ordinary amount of sewage known as the dry weather flow to the large quantities introduced into the system from paved streets and roofs during even light rains, it is practically impossible to so construct and regulate works for the purification of the total flow that good results may be had at all times.

The expense of dealing with the large volume of greatly diluted sewage in times of heavy rainfall would be enormous. The exclusion of all storm and sub-soil water from your system of sewers is, therefore, of great importance.

It follows then, that having to purify your sewage, you are fortunate in being so situated that the removal of storm and sub-soil water can be accomplished at a nominal expense. The natural contours of the surface suggest the division of your village into four (4) sewer districts as outlined by Mr. J. F. Brown, C. E., in a report under date of March 2, 1896, each district to be provided with a separate main sewer converging to, and discharging at, the same point, which point has been selected in the valley of Dugway brook immediately south of the Lake Shore and Michigan Southern Railway, where it is proposed to construct sewage purification works. By this division into separate districts the expense of construction will be lessened and a more equitable distribution of assessments secured than by any other method.

As that district west of the Bratenahl road is now listed in the city of Cleveland for sewer taxation, and as it is probable that this district will shortly be taken within the corporate limits of Cleveland, the sewerage of this district will devolve upon the authorities of that city, and is therefore not included in the general plan proposed. For that district lying between Bratenahl road and Dugway brook, described as Doan Sewer District No. 2, it is proposed to construct a main sewer on Doan street commencing at the south corporation line of the village and running north to Stanley street; thence east on Stanley street to an alley; thence north to the south line of a tract of land owned by the Curtis and Ambler Realty Co.; thence northeast through said land along the side of the high bluff on the west side of Dugway brook valley to the land owned by the village, where the sewage will be discharged at the sewage purification works. Submain sewers are proposed on Ludwig, St. Clair, Avondale, Burton, Haldeman and Lewis avenues, and on Doan street from Haldeman avenue south to Stanley street. For that portion of the district lying east of Parkwood avenue, and south of Massie street, it is proposed to construct a submain sewer on Parkwood avenue, and extend the same north to Massie street, and west on Massie street to the Doan street main. With the exception of Salisbury avenue and Lewis street south of the L. S. & M. S. Railway, each street in the district can be provided with sewers laid at a sufficient depth below the surface, and with gradients to insure a velocity that will, with the flushing facilities hereinafter described, keep the whole system in a sanitary condition and prevent the accumulation of deposits, which upon decomposing, are the sources of the foul odors generally termed "sewer gas" so prevalent in a badly designed or insufficiently flushed system. It will be impossible to provide sewers for Salisbury avenue and Lewis street south of the L. S. & M. S. Railway discharging by gravity into the general system while the present grades of these streets remain unchanged. Filling will be necessary in both cases. It will also be advantageous to raise the grade some on Harvard street, as indicated on the profile; but this is not so important as in the case of the other streets noted.

For that district described as Lake View Sewer District No. 3, it is proposed to provide a main sewer on Lake View avenue commencing at the south corporation line of the village, and running from thence north to St. Clair avenue; thence west on St. Clair avenue to the line between original survey lots Nos. 262 and 263; and thence north on said line to the land owned by the village, where it will be conveyed across the valley of Dugway brook by means of an inverted siphon to the purification works. The construction of this sewer will necessitate obtaining a right of way for laying the same through private lands north of St. Clair avenue, or opening up and extending Lake View avenue north of St. Clair avenue, as indicated on general plan.

For Eddy Sewer District No. 4, it is proposed to construct a main sewer on Eddy road, commencing at the east corporation line of the village; thence running northwesterly, and north along the Eddy road to Kirby avenue; thence west along Kirby avenue extended to the east side of Dugway brook valley, and from thence across the valley by an inverted siphon to the high bank on the west side of the valley on the lands owned by the village, from whence it will run to the purification works.

A full statement of the quantities of excavation, and the various materials to be used in the construction of the sewers in Doan sewer district, together with the estimated cost of each sewer, is contained in the subjoined sheets.

The sewers are designed to be located, with few exceptions, in the centers of the streets. Where drains, or storm water sewers are at present located in the center, it will be well to avoid any interference with them by laying the new sewer ten (10) feet from the center. On streets improved with pavements, it is designed to lay a sewer on each side of the street between the curb and the lot line. On St. Clair street, where a double line of street car tracks at present occupy the center of the roadway, I have designed two lines of sewers; one to be laid on each side of the street and ten (10) feet from the curb. It is not well to lay two lines of sewers indiscriminately on all streets. There is no real economy in it to the property owner, and the first cost of the system for which the town is bonded, and upon which interest is paid, is largely increased thereby. The sewers on streets likely to be occupied by business rooms are to be laid to the depth of twelve (12) feet from the surface of the street, or as near that depth as the grades of streets and sewers will allow, thus furnishing drainage for basements. On residence streets the sewers are to be laid to a depth of not more than ten (10) feet, or less than eight (8) feet, with an allowance for possible change in the street level by cutting, except in a few cases where it has been found impossible to secure a greater depth than six (6) feet, owing to the irregular character of the surface.

The sewers are designed to run half full while discharging the maximum flow of sewage of forty (40) inhabitants for each one hundred (100) feet of sewer (or ten (10) persons to each fifty (50) foot lot), the amount of one hundred (100) gallons being allowed per capita, and the whole discharge to take place during sixteen (16) hours. While this computation has been made in each case for the main sewers and the laterals for their entire length, it remains true that with the size of pipe adopted for lateral sewers, which is eight (8) inches, the upper ends of lateral sewers will be more than sufficient in size. Yet nothing can be gained by reducing the size of laterals below eight (8) inches in diameter. The increase in cost from a six (6) inch pipe to an eight (8) inch one is very slight, and with a pipe of less than eight (8) inches in diameter stoppages are more likely to occur from the introduction of improper substances through house drains into the sewer.

The amount of sewage allowed for in computing the proper size of sewers is vastly more than your present discharge would be. But it must not be forgotten that by reason of its location and natural advantages your village is destined in the future to be a thickly populated municipality, and by making a proper allowance now at a slightly increased cost, you provide a permanent improvement. Nothing is more irksome and unsatisfactory to a taxpayer than the necessity of reconstructing and enlarging works of a public nature before the assessments are fairly paid for their first construction.

The sewers are to be provided with man-holes at each change of grade or direction, and at intermediate points as indicated on the plan and profiles. Each man-hole is to be furnished with a cast iron cover provided with ventilating holes for the purpose of admitting fresh air into the system. Beneath the man-hole cover a dirt pan is to be suspended to catch sand and street detritus, and prevent the introduction of such substances into the sewer. These pans will require occasional attention and cleaning. The junctions of all lateral sewers with the main and sub-main sewers are to be made at man-holes as indicated by detail drawing. Flush tanks are to be constructed at the head of all lateral sewers. These flushing tanks have been called the "life" of a sanitary sewerage system. While in some cases they may be dispensed with, occasional flushing is of great importance in maintaining the condition necessary to the proper and sanitary operation of a sewerage system. The tanks are constructed of brick masonry rendered water-tight and are filled by a small stream of water from the public water supply. An automatic arrangement discharges the accumulated water when the tank fills to the proper height, and by the sudden and rapid introduction of the whole volume fills the upper length of the sewer, thus producing a current of sufficient velocity to sweep all stranded particles along with the flow to the main sewer.

The size of tank and flushing siphon proposed will contain at the moment of discharge 442 gallons of water, which will fill the upper length of an eight (8) inch pipe for a distance of one hundred and forty (140) feet.

The flushing siphon will discharge the water from the tank as rapidly as the sewer will receive the flow.

It is of prime importance that the sewage should arrive at the purification works for treatment before becoming decomposed. To insure the delivery of fresh sewage at all times at the works the flush tank should be supplied with sufficient water to discharge once in each twenty-four (24) hours. Flushing by hand with a hose accomplishes less good than automatic tanks, besides, if regularly done, consuming more water and costing more for labor,

SUB-SOIL DRAINAGE.

Sub-soil drainage will be accomplished by laying a line of vitrified pipe with hub and spigot joints, not cemented, surrounded by cinders in the same trench, and below the sewer. The pipe proposed for use is what is known as second quality sewer pipe, *i. e.*, pipe rejected for use in sewer construction for defects which will not interfere with its use for conveying clear water. Where the sewer and drain is laid in clay, vertical drain inlets will be constructed, in the manner described by the specifications, at intervals. These inlets being brought up to the level of the sand above the clay will serve to drain the soil above the impervious stratum. The location and number of the inlets to be constructed must be left largely to the judgment of the engineer in charge of construction, as the work proceeds.

The importance of the proposed system of under-drainage is great, and the work should be well and carefully executed. Your soil being for the most part a fine sand resting upon a stratum of clay, holds water to the point of saturation, and gives trouble by flooding basements and cellars. After the soil is once thoroughly drained to the depth proposed, it will be in the condition of a squeezed sponge, and a heavy rainfall will pass slowly downward to the level of the drains without spreading laterally to any great extent. Thus a drain of a size much too small to receive storm water directly from the gutters or roofs of a single block, will be ample for the drainage of a much larger district, where the same amount of water occupies a long time in passing through a thick stratum of sand on its way to the joints in the drain.

In the Doan Sewer District it is proposed to provide three different outlets for sub-soil drainage. One to be located at the intersection of Parkwood avenue extension and Dugway brook, which will drain the streets tributary to the Parkwood avenue sub-main; the second one to be at the intersection of St. Clair street and Dugway Brook to drain the streets tributary to the Doan street main south of St. Clair street; and the third one to be into Dugway brook at the south line of the land purchased by the village for sewage disposal.

SEWAGE PURIFICATION WORKS.

As the sewage of your village cannot be discharged directly into Lake Erie, or into any stream flowing through the village, the purification of the sewage is necessary. The purification, or partial purification, of sewage is in practice limited to two different methods under the broad titles of Chemical Precipitation and Land Disposal, or to certain combinations of the two forms of treatment modified more or less by ruling conditions.

By chemical precipitation the removal of insoluble, and to a lesser extent soluble organic matter in the sewage is effected by the use of chemicals introduced into the sewage, which is then brought to a state of rest, or allowed to flow slowly through tanks, usually constructed of masonry. The work of purification, in a purely chemical system, ends with such treatment and the resulting liquid, freed from its grosser impurities is allowed to flow into the stream or other outlet, where, if the volume of water in the stream be sufficient, and other conditions are favorable, further purification is effected by natural agencies. The matter deposited by precipitation, which is termed "sludge," is a darkly colored mud, containing about ninety parts of water to ten parts of solid matter. This sludge if allowed to remain in a semi-fluid state will sooner or later decompose, throwing off as a result foul odors. The chemicals used in precipitation having arrested decomposition only, and in no way prevented the final putrefaction of organic matters. Where the works are situated at a considerable distance from habitations, it is possible to run the sludge on to filter beds, and after draining sufficiently, remove the residue and apply it to land or burn it in a garbage furnace. But the best and most convenient way, as involving less labor and space required, is to force the sludge into a press made expressly for the purpose by pumping machinery, where the fluid escapes leaving the sludge proper in the form of moist portable cakes. These cakes can be removed and applied to land, or after further drying, can be burned. The results obtained by chemical precipitation are, the removal of from 30 to 60 per cent. of the total organic matters, soluble and insoluble; the concentration of the resulting sludge, and the deodorizing of the sludge and sewage for a sufficiently long time to enable them to undergo further treatment without offensive odors.

In the land disposal of sewage, purification is attained by purely natural agencies, assisted and regulated by the arrangement of the works to conform to the material in use, and by the application of the sewage in such volume as to secure the best results.

In the system termed intermittent filtration, the sewage is applied to sand, gravel or porous soil usually well underdrained in intermittent doses, allowing ample time between each application of sewage for the soil to drain thoroughly, thus admitting air to the soil between each dose.

Purification is effected by minute organisms termed nitrifying bacteria. These organisms are found to a greater or less extent in the upper layers of soil, and are present in sewage itself. Upon the first application of sewage to a filtration area, the organisms are insufficient in number to deal with the sewage, unless the amount applied is small; but after a few days, in summer, and a longer period in winter, these organisms increase rapidly and form colonies in the soil, coating each particle with a gelatinous film, and the sewage as it flows past them is subjected to a change by the action of these organisms, whereby the organic matters in solution are resolved into harmless mineral nitrates. The matters in suspension are strained out by the upper layers of the soil, and are acted upon in the same way in so far as this matter may be organic in composition, requiring, however, a longer period for nitrification to be accomplished. It is by this perfectly natural process that manure of any description is fitted for plant food after application to the soil. The nitrifying organisms require a supply of oxygen in order to exist and accomplish their work of purification. As sewage usually contains little or no free oxygen upon its arrival at the filter beds, it is necessary to supply this lack by admitting air freely to all parts of the filter. Hence the necessity for the intermittent application of sewage from which this process derives its name. The amount of sewage that can be purified upon one acre of soil depends largely upon the nature of the soil and upon the character of the sewage. No rule can be given that will apply equally to all material and conditions. The investigation of this subject, undertaken by the Massachusetts State Board of Health, and carried on constantly by them for many years at their experiment station at Lawrence, Massachusetts, has thrown great light upon the subject, and has furnished data which places it upon a scientific basis. I shall have occasion to refer to their work and deductions frequently in this report. It has been found by their investigations that the size of sand, gravel, or other substances, together with the uniformity of the several particles, practically fixes the adaptability of the material to the purpose, and indicates the amount of sewage that can be applied at one time, and the period of rest necessary between doses; which gives as a result the amount that can be applied daily with good results to a given area.

Where underdrainage is necessary the usual practice is to lay the drains at a depth of from five (5) to six (6) feet beneath the surface, lesser depths allowing the sewage to pass through the soil too rapidly to effect complete purification.

If the amount of sewage applied, and its method of application is adjusted to the capabilities of the soil, excellent results follow and the sewage is purified before odors can arise. Sewage filtration areas of sufficient area, properly regulated, are free from offensive odors. On the other hand, if the area is too small, or the work improperly designed or constructed, or if sufficient attention is not given to the proper distribution of the sewage, the process becomes a nuisance, and offensive odors arise which force the abandonment of the works and entail a loss of the money invested in their construction.

It is from the fact that both chemical precipitation works and land disposal systems have been forced upon communities by eager advocates of their favorite method, without due regard to the local conditions, that both systems have been from time to time condemned by the sufferers.

Where suitable land of sufficient area can be obtained, intermittent filtration is by far the most perfect and cheapest method of purifying sewage. Where a sufficient area can be obtained, although the soil may not be suitable, and where a high state of purification is required, artificial filter beds can be constructed. Where a sufficient amount of land cannot be obtained for intermittent filtration, and where all requirements will be served by the removal of about 50 per cent. of the putresible matters in the sewage, chemical precipitation works can be introduced. But in a case where sufficient land cannot be obtained for intermittent filtration, where the works must be located in close proximity to valuable residential property, and where the sewage must be purified to a high degree, a combination of the two systems, modified as the case may demand, must be used to obtain perfect results.

Of broad irrigation with sewage I have said nothing, as the case in hand leaves this form of treatment out of the discussion. Broad irrigation differs from intermittent filtration principally in the amount of sewage applied to the soil, which for the former method is far less than the latter. The system is arranged to irrigate and manure the soil for the raising of various crops, and demands large areas.

CONDITIONS AT GLENVILLE.

Your village is in possession of about fourteen (14) acres of land for sewage disposal purposes, situated in the valley of Dugway brook, and immediately south of the L. S. & M. S. Railway. This location is the most desirable one that could be obtained for the purpose.

The area is, however, a limited one, and especially so as by reason of the high bluffs on each side of the tract there is but a small portion of the tract that can be reached by your proposed main sewers, so that the sewage may discharge by gravity upon the surface. I have caused test pits to be dug at intervals over the tract, and find that in the valley the soil is for the most part unsuitable for the filtration of sewage in its present condition. On the higher ground, however, I found a fine sand in depths varying from two (2) to seven (7) feet. Being desirous of obtaining the most absolute knowledge of this material from the highest authority, I sent a sample to Mr. Allen Hazen, consulting engineer, New York City. Mr. Hazen, who was for several years in charge of the experimental work of the Massachusetts State Board of Health, is perhaps the best informed gentleman upon the capabilities of sand for sewage filtration in the United States. I respectfully present his letter addressed to me upon this subject, together with the result of his mechanical analysis of the material, herewith:

"May 21, 1897.

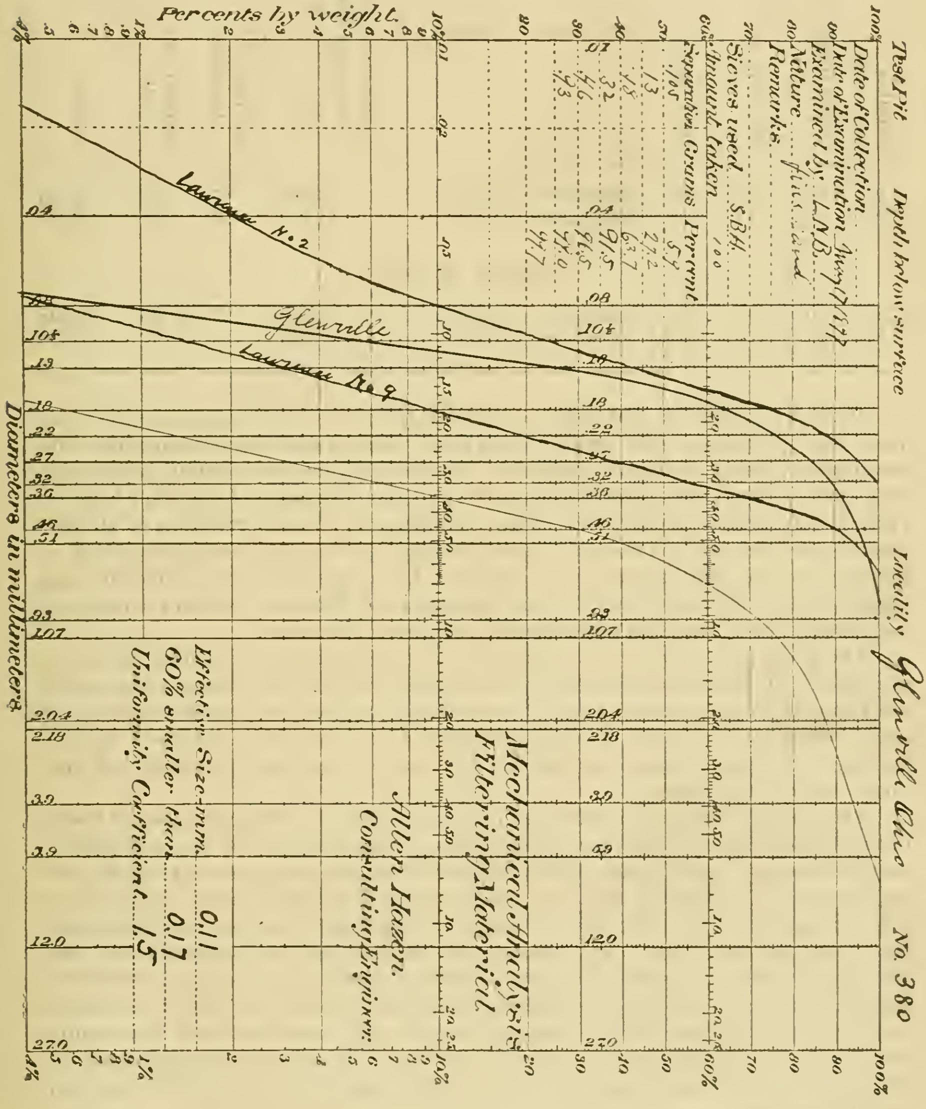
MR. J. P. FORCE, Fostoria, Ohio:

DEAR SIR: I beg to submit the enclosed analysis of a sample of sand from Glenville, Ohio, proposed for use in connection with the sewage disposal of that place. The sand has an effective size of 0.11 millimeter and a uniformity coefficient of 1.5. It is well adapted to the work of sewage purification, within certain limits. You will get the best idea of its capacity and methods of treatment by comparing it with the sand used in tanks Nos. 2 and 9 at Lawrence, which you will find discussed at length in the reports of the Massachusetts State Board of Health for 1890 and

1891 particularly, and subsequent years. Plottings of analyses of these sands have been made, for your convenience in red on the same sheet as the analysis of the Glenville sample. This sand is about half way between the two, but more uniform than either. In appearance it closely resembles the soil of the Berlin sewage farm, but is slightly finer and more uniform. A sufficient area of this material should be provided if it is used, and care will, of course, have to be taken with the underdrainage, and if the conditions are proper, excellent results will be obtained from it.

Very truly yours,

ALLEN HAZEN.



The record for the experimental filters Nos. 2 and 9 mentioned by Mr. Hazen for the years 1894 and 1895, as taken from the annual reports of the Massachusetts State Board of Health for these years, are here tabulated:

RECORD OF 1894.

Number.	Depth of sand, inches.	Effective size.	Uniformity coefficient.	In operation since.	Aggregate rate of filtration, gallons per acre daily, 6 days in a week.	Average per cent. removed of—		
						Albuminoid ammonia.	Oxygen consumed.	Bacteria.
2	60	.08	2.0	December 19, 1887.. ...	43,900	97	96	99.95
9	60	.17	2.0	November 18, 1890......	74,500	94	92	99.0
RECORD OF 1895.								
2	60	.08	2.0	December 19, 1887......	34.000	97	95	99.98
9	60	.17	2.0	November 18, 1890......	66,000	90	80	98.70

It is my judgment that with the sand at Glenville, by transporting it to the valley and preparing well underdrained filter beds, sewage as it comes from the sewer after passing through a screen can be applied at the rate of 50,000 gallons per acre daily, if sufficient care is exercised in the maintenance of the filter beds by raking the surface weekly, and removing promptly all accumulations of sludge. There is no question but that an ample degree of purification could be secured in this way for the limited amount of sewage. Let us see if we have sufficient area to provide for the present and future population of Glenville, without overtaxing the capabilities of the filters and thereby creating a nuisance.

The present population of Glenville is about six thousand, as near as can be estimated. Of that number about four thousand inhabit the district tributary to the Doan street main sewer, which I understand it is your purpose to construct at once. What the population of that district will be in two years from now can only be roughly estimated; but it is likely to increase to at least five thousand, and may go far beyond that figure.

The amount of sewage contributed by the population of different cities and towns in the United States varies from 60 gallons to 100 gallons per day for each inhabitant, the average being nearer the maximum than the minimum. Allowing, for the purpose of estimating, that the contributing population in two years will be four thousand, and that the flow of sewage will be only 70 gallons per inhabitant daily (both figures being in my judgment the smallest that can be considered), the total daily flow, if all sub-soil water is excluded from the sewers, will be 280,000 gallons, which will pass off in sixteen hours or less. 280,000 gallons of sewage to be purified at the rate of 50,000 gallons per acre (the maximum rate) will require five and six-tenths (5.6) acres of filter beds to be in daily use, with no allowance for periods of rest for regrading the surface or repairing any part of the filter that may require attention.

The land owned by the village contains but about five (5) acres that can be utilized for the construction of filter beds without great expense, and the sand is not in sufficient quantities for preparing a larger area. Of this five (5) acres at least one-half of one acre would be lost for filtration purposes by embankments.

Thus it will be seen that a purely land disposal system is not to be obtained for Glenville without great cost. The probable future increase in population demands that whatever system is adopted ample provision should be made on the start for the enlargement of the works as the increased flow of sewage require larger capacity for handling and purifying the flow. Land situated favorably with regard to the sewer system, as to character of soil and elevation is, unfortunately for this purpose, among the highest priced property in the village and will certainly not decrease in value as the village increases in population.

The sewage of Glenville must be purified to a high degree and in such manner that no complaints may arise against the processes used by reason of offensive odors caused by the method of treatment, or by mismanagement of the works during operation.

Chemical precipitation will not affect a state of purification sufficient for the effluent to be turned directly into Dugway brook. This small stream, flowing as it does through valuable property, must be maintained in a pure condition, or the village will be involved in litigation. Having stated that land disposal and chemical precipitation are impracticable, on account of insufficient land and expense of construction for the first, and the insufficient results to be expected from the second process, I will proceed to explain what may be accomplished by a combination of both processes, modified to suit the case in hand. Where it is necessary to resort to filtration of sewage on small areas, a higher rate of filtration may be secured by removing the grosser impurities before applying the sewage to the filter. This may be accomplished in several ways. By sedimentation in settling tanks; by straining through coarse gravel, or coke; or by sedimentation in tanks hastened by the use of chemicals.

In regard to the first method I will quote from the annual report of the Massachusetts State Board of Health for 1895. On page 463, under the head of "Removal of Sludge from the Sewage," and in speaking of the various sewage filtration areas at different places in the State, the report says:

"As a matter of fact the sludge is generally settled out to a considerable extent at the filtration areas, and applied to separate beds. This method has its advantages, as it concentrates the sludge, and keeps a large amount of clogging material from flowing upon the regular filtration beds. This is especially advantageous in winter, as has been mentioned before. Its disadvantages are, that the sludge, so concentrated, is much more offensive than when allowed to flow upon the filtration areas as rapidly as possible, and become exposed in thin layers to the air.

Personal observation and experience has convinced me long since of the truth of these statements, and I am of the opinion that sludge cannot be satisfactorily handled from simple sedimentation tanks, or applied to sludge beds at any point where offensive odors have to be eliminated from the works, unless it be in exceedingly small quantities and great care be exercised in its treatment.

For the same reason it would be unwise to attempt straining crude sewage through gravel or coke at the location of the proposed works.

The process would be satisfactory so far as the removal of the grosser impurities in the sewage are concerned; but this extremely high rate of filtration in the absence of sufficient oxygen, and the resulting undeodorized sludge would render the works in a short time a public nuisance, which would result in its condemnation and the condemnation of its promoters.

Experiments have been made by the Massachusetts State Board of Health upon the results to be derived from the various practical methods of extracting the sludge before final filtration, and the rate at which it may be afterwards applied to sand filters. I will insert here for your further information tabulated statements of the results of their experiments during the years 1894 and 1895:

TABLE SHOWING PURIFICATION OF SEWAGE BY DIFFERENT METHODS TO REMOVE SLUDGE—1894.

Method.	Average per cent. removed of—		
	Albuminoid ammonia.	Oxygen consumes.	Bacteria.
Chemical precipitation	57	50	68
Sedimentation	30	21	15
Straining though coke	52	44	43

TABLE SHOWING TOTAL PRECIPITATION OF SEWAGE BY FILTRATION THROUGH SAND AFTER A PRELIMINARY TREATMENT TO REMOVE THE SLUDGE—1894 AND 1895.

1894.

Method of preliminary treatment.	Depth of filter, inches.	Effective size.	Uniformity coefficient.	In operation since.	Gallons per acre daily, 6 days in a week.	Average per cent. removed of		
						Albuminoid ammonia.	Oxygen consumed	Bacteria.
Chemical precipitation	60	.17	2.0	January 28, 1890	253,000	96	93	99.8
Sedimentation	60	.19	2 0	September 27, '93	184,600	95	94	99.8
Straining through coke	60	.19	2.0	June 1, 1894	345,000	97	94	99.9
				1895.				
Chemical precipitation	60	.17	2.0	....	200,000	97	95	99.9
Sedimentation	60	.19	2.0	....	160,000	95	91	99.6
Straining through coke	60	.19	2.0	....	320,000	96	94	99.8

It will be seen from an inspection of the table that by chemical precipitation the removal of 57 per cent. of albuminoid ammonia and 68 per cent. of the bacteria in the sewage was effected, and that the resultant liquor was applied to sand filters at the rate of from 200,000 gallons to 253,000 gallons per acre daily, with the result of removing from 96 per cent. to 97 per cent. of the albuminoid ammonia, and from 99.8 per cent. to 99.9 per cent. of the bacteria.

The precipitation was effected by allowing the sewage to remain standing in tanks for about four hours after adding the chemical used which was sulphate of alumina.

The usual practice is to allow the sewage to flow slowly through a series of tanks after the introduction of the chemicals, and the extent of purification attained in this way is generally less than as indicated by the method followed by the Massachusetts State Board of Health. In the annual report of the Ohio State Board of Health for 1895, the results of analyses of sewage and effluent from the chemical precipitation works at Canton, Ohio, which are operated on the continuous method, however, show a removal of 66.6 per cent. of albuminoid ammonia, and oxygen consumed 59.8 per cent. The chemicals used at Canton are lime and sulphate of alumina.

The great advantages to be derived from the use of lime as an adjunct to a process for the case under discussion are, first, the aid to be derived from it in precipitating and concentrating the sludge for further treatment; secondly, the action of lime as a deodorant and a means of arresting decomposition; and thirdly, its cheapness as compared with other chemicals in use for the same purpose. It should be added in sufficient quantities only to combine with the carbonic acid in the sewage, whereby calcium carbonate is formed and a clarification attained equal to the removal of all of the insoluble organic matters, and about 10 per cent. of the soluble. The amount of lime to be added to the sewage being from eight to twelve grains per gallon. An excess of lime beyond that indicated is of no benefit and is of positive detriment.

I recommend, therefore, that the preliminary treatment of your sewage be effected by precipitation in tanks operated upon the intermittent principle, thus allowing time for the full benefit of the process to be realized, and that time alone be used as a precipitant. In regard to the final treatment of the sewage before discharging it in a sufficiently purified condition, I find that this can best be accomplished by bringing the effluent from the tanks under the influences of the nitrifying organisms in a filter of small area, constructed of coke breeze, to be operated quite differently from the usual sand filters, and finally by discharging the further purified effluent on a limited area of sand filters, intermittently, thus accomplishing a very high state of purification, with an entire freedom from odors, and at a reasonable cost for construction and maintenance.

The coke filters proposed for use in connection with the process are based upon the experiments, on a practical scale, carried on by Mr. W. J. Didbin for the London county council in 1894 and 1895, as follows:

"An experimental filter was constructed of one acre in extent composed of coke breeze to the depth of three feet covered with three inches of gravel. The filter was well underdrained. The sewage was the effluent from the Barking Chemical Precipitation Works. The process of operating the filter was to fill it as rapidly as possible, allow the sewage to remain in the filter one hour, and then draw off the effluent with the least possible delay. This filter was operated for nearly one year, part of the time being the "exceptionally severe weather in January and February, 1895." The best results obtained were in August, when 87.6 per cent. of the organic matters was removed while the filter was receiving 866,881 imperial gallons per day. The poorest result was in June, when 73.1 per cent. of the organic matters was removed while the filter was treating 980,408 gallons per day.

Mr, Didbin reports: "The experiments taken as a whole show that sewage, especially if previously clarified by precipitation, may be purified to any degree, the actual amount of purification depending upon (1) the length of time during which the effluent is allowed to remain in contact with the filter; and (2) length of time allowed for aeration. If a reduction of 75 per cent. in the oxidizable organic matters in solution be considered as sufficient, the quantity that can be treated per diem on an acre of coke breeze is one million gallons. This rate is probably the highest that can be worked under all conditions of season." The gallon given in

Mr. Didbin's report is the imperial gallon of 277,274 cubic inches, or about 1.2 United States gallons which would give 1,200,000 U. S. gallons as the amount recommended in his report.

Mr. Didbin further reports that at the end of the experiment, the filter was "clean and sweet," and that no labor was required to maintain it in a perfect condition other than to restore the original level of the surface at points where, by the imperfect construction of the inlets, holes were washed in the surface by the inflowing sewage. It has been proposed to effect final purification of the sewage of the city of London by means of such filters, constructed to the extent of 180 acres.

The result of this experiment has suggested a practical and comparatively inexpensive way of supplementing chemical precipitation where, as in the case before us, the area is limited and the expense of providing additional territory, and constructing artificial sand filters of large extent, is to be accomplished only at great expense. Coke is in use in many sewage purification works for filtering or straining sewage; but the experiments of Mr. Didbin carried out on such a practical scale have furnished valuable data as to the best and most economical way of using it. By his method every facility is afforded for the extensive cultivation of the nitrifying bacteria and the sewage kept in contact with them for a sufficient time to enable their maximum effect to be realized. The usual way being to flood the surface of the filter and allow the liquid to drain downward through it, the time allowed for contact being regulated entirely by the amount of sewage applied, and the retarding influence of friction.

Coke filters, operated as by Mr. Didbin, are truly biological filters, and offer the best solution of the problem in hand.

For the disposal of the sludge at the proposed Glenville works, I recommend that a filter presss be used, into which the sludge be pumped by a duplex steam pump having valves especially adapted to the purpose, and that the resulting sludge cake be disposed of by further drying under a shed and burning. It will simplify the disposal of sludge greatly in the future when its daily production has become considerable to construct a garbage furnace in which the sludge, together with the garbage of the village can be burned and disposed of.

In the beginning, when the amount of sludge extracted is small, it may be pumped directly to the shallow trenches excavated in the soil and covered lightly with earth; but it will be best to install all necessary machinery in the beginning so that when it is needed it will be at hand, and no additional funds will be necessary to put the plant in complete working order. It is proposed to construct works at present of a sufficient capacity to treat the sewage of four thousand persons, leaving room for additions in the future as the population increases. The general plan as presented is arranged for the purification of sewage, from a contributing population of 14,000, with room for some extension.

DESCRIPTION OF PROPOSED WORKS.

The works recommended to be constructed at present consist of, a building two stories in height, 25 x 35 feet in plan, to contain a horizontal tubular boiler forty-four inches in diameter by twelve feet in length; a lime mixer five feet in diameter and six feet high; a vat for slacking lime, to be located in the second story; a filter press with fifty cells or compartments, and a duplex steam pump for forcing sludge into the filter press. Two masonry settling tanks Nos. 1 and 2 of a capacity of 50,000 gallons each, provided with floating outlets for drawing off the clarified sewage, and connected with the sludge well by outlet pipes provided with gates. A channel for conducting the sewage from the sewers through the building to the settling tank, provided with flash boards and a screen. Two coke filters, Nos. 1 and 2. of an area of 8,100 feet each, underdrained and filled with coke to a height of three (3) feet, and covered with four (4) inches of coarse clean gravel. Sand filters Nos. 1, 2, 6 and 7, containing a total area of .988 acre, to be constructed by embanking, and excavating all improper material and supplying its place with sand selected from the higher ground, and to be thoroughly underdrained, the drains to discharge into Dugway brook. There will be a sludge well constructed of masonry twelve (12) feet in diameter into which the sludge will flow from the settling tanks, and from which it will be lifted by the sludge pump.

The works are to be operated in the following manner: The sewage as it enters the building will receive the proper amount of lime, in the form of milk of lime, after which it will pass through a screen formed of parallel iron bars spaced three-fourths of an inch apart, where the paper and other large objects will be screened out and removed from time to time, and burned in the furnace beneath the boiler, after passing through the screen the sewage will flow through the channel to the settling tanks. In the channel will be placed baffle boards, so arranged as to agitate the sewage and insure a more perfect mixture with the lime. The sewage will flow into a settling tank, which upon filling will be shut off from the sewage channel by means of a flash board, and the sewage will be diverted to tank No. 2. While tank No. 2 is filling, the sewage in tank No. 1 will be resting in a quiescent state, and a sufficient time allowed for clarification by precipitation. Just before tank No. 2 fills, the clarified liquor in tank No. 1 will be drawn off by means of a floating outlet provided with a swivel joint, and discharged into coke filter No. 1, where it will remain in contact with the filter for one hour, and then be discharged from the underdrains beneath the filter onto one of the sand filters. In the winter, or in times of high water in the brook, the effluent from the coke filters may be discharged directly into the brook. Modifications of this process may be suggested by the character and extent of your sewage, which can only be estimated at present. It is usually the case that experience in the operation of a certain plant, and intelligent observation of its working will be of more assistance to the man in charge than hard and fast rules.

The proposed works are estimated to cost as follows:

Building	$2,800 00
Boiler and machinery, erected	3,350 00
Tanks, sludge well and sewage channel	4,244 00
Coke filters	3,000 00
Sand filters, pipes, gates, etc	3,150 00
Total	$16,544 00

The running expense for a contributing population of four thousand will be about as follows:

Labor, one man at $2.00 per day	$2 00
Lime at the rate of 12 grains per gallon	1 09
Fuel, oil, etc	1 85
Total	$4 94

Or $81,06.75 per year, which would be a cost of about 45 cents per annum per each person contributing sewage. This may seem high upon first inspection, but at the price paid for cleaning cesspools during one year for the same number of people, it will be found to be by far the cheapest way of disposing of excreta and liquid household waste even if the interest on the cost of construction is added pro rata.

The cost will not increase proportionately with the number of persons contributing sewage; but will be less per capita.

I recommend that the construction of the building, settling tanks and sludge well, and the furnishing and erection of machinery, be let by contract, and that the underdrainage, grading and construction of the coke and sand filters be done by day labor under competent supervision, as the latter items consist principally of labor and require to be carefully and throughly done to insure successful operation.

Respectfully submitted,

(Signed) JOHN P. FORCE,
Engineer.

Columbus, Ohio, June 21, 1897.

OHIO STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
COLUMBUS, February 18, 1898.

MR. JOHN P. FORCE, Consulting Engineer, Glenville, Ohio.

DEAR SIR: By an oversight the official notice of the approval of your plans for a system of sewerage and sewage disposal for the village of Glenville, Ohio, has not been sent to you. You are hereby notified that at a meeting of the State Board of Health, held in Cleveland, Ohio, June 23, 1897, the plans presented by you for a sewerage system and for disposing of the sewage of Glenville were approved

Respectfully,

(Signed) C. O. PROBST,
Secretary.

By order of the Board.

CHANGE IN PLANS APPROVED FOR SEWAGE DISPOSAL AT GREENVILLE.

FOSTORIA, OHIO, January 19, 1897.

To the Honorable State Board of Health:

GENTLEMEN: I am directed by the city council of Greenville, to ask your honorable body to allow a modification in the plans for the disposal of the sewage of said city, approved by you October 30, 1895. The modification to consist in the construction of the works in part for the present, leaving out all parts of the works as shown on plans with the exception of the screen chamber and filter beds. The area to be used in filter beds is about 10 acres of gravel overlaid by loam. As it is not likely that for several years at least over 40 per cent. of the present population of 5,000 will avail themselves of the advantages of sewerage, this will place the population contributing sewage at about 200 per acre. It is believed that with this low rate per acre the separation of the sludge will not be necessary before applying the sewage to the soil. The citizens of Greenville will vote on the question of sewerage at the April election, and it is likely that the reduced cost of the works will induce many to vote favorably, thus increasing the chances of introducing sewerage, badly needed at present, in the city of Greenville.

Respectfully submitted,

(Signed) JOHN P. FORCE,
Consulting Engineer.

At a meeting of the State Board of Health, held in Columbus, Ohio, January 20, 1897, the above named modifications in the plans for sewage disposal for the city of Greenville were approved.

Attest: (Signed) C. O. PROBST,
Secretary.

SEWAGE DISPOSAL AT THE HARDIN COUNTY INFIRMARY.

At a meeting of the State Board of Health held in October, 1897, Mr. W. E. Myers, C. E., presented plans for disposing of the sewage of the Hardin County Infirmary by means of subsurface irrigation.

The plans in brief provide for a flush tank used as a receiving well, with a basket screen, removable for cleaning; a six inch vitrified sewer pipe, with cemented joints leading to the receiving field, and connecting with drain tile laid 16 inches below the ground surface. Beneath this system of pipes, which receive the sewage, is a second system of drain tiles, laid three to three and one-half feet below the surface, which are intended to lower the ground water to that depth, and also receive the filtered sewage which is carried to a main drain leading to the Scioto river, 2,500 feet from the absorption field.

The present number of inmates of the infirmary is 74; future number, estimated, 140. Present water consumption 10 gallons per capita; future consumption, 50 gallons per capita.

The plans were approved as shown by the following:

Ohio State Board of Health,
Office of the Secretary,
Columbus, October 25, 1897.

W. E. Myers, C. E., Kenton, Ohio.

Dear Sir: The State Board of Health has considered your plans for the disposal of the sewage of the Hardin County Infirmary by means of subsurface irrigation, and you are hereby notified that said plans have been approved by the Board.

Yours respectfully,
(Signed) C. O. Probst,
Secretary.

By order of the Board.

REPORT ON A PROPOSED SEWER IN HYDE PARK.

To the State Board of Health:

Gentlemen: Having been appointed to inspect and report upon plans and location of a proposed sewer in Hyde Park, Hamilton county, I would respectfully present the following report of an inspection made by me on July 27, 1897.

The proposed sewer is to supplement one already built but which has been found insufficient in size to carry off the storm water during heavy rains. The grade of the streets at the intersection of Erie and Edwards avenues is such that an enormous quantity of water accumulates at that place during hard rains, sometimes filling the street so much as to interfere with the running of the street cars.

This sewer is to be oval in shape, 2 feet 6 inches by 3 feet 9 inches for a distance of 455 feet on Erie avenue to Michigan avenue, then

3 feet 4 inches by 5 feet for a distance of 105 feet through private property to Crawfish creek. For the present it is proposed to use it only for storm water, but it is to be used for house connections whenever the State Board of Health will permit of such use. This sewer will not take the place of any part of the sewer system adopted by the Hyde Park syndicate, but is to relieve a condition caused by the insufficient size of a sewer already built and will be upon a different line.

I would recommend that the application of the authorities of Hyde Park be granted, upon condition, first, that no house connections shall be made until permission for such use is given by the State Board of Health, and, second, that it shall not be connected with any sewer having house connections without consent of said Board.

Respectfully submitted,

BYRON STANTON,
Committee.

OHIO STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
COLUMBUS, August 4, 1897.

MR. FRANK LEWIS, Corporation Clerk, Hyde Park, Ohio.

DEAR SIR: The State Board of Health has considered your application for approval of a sewer on Erie avenue with an outlet into Crawfish creek. You are hereby notified that your plans for said sewer have been approved by the Board subject to the following conditions; viz.:

That no house connections be made with said sewer, and that it shall not be connected with any sewer having house connections without the permission of the State Board of Health.

Respectfully,
(Signed) C. O PROBST,
Secretary.

By order of the Board.

PLANS PROPOSED FOR A SEWAGE DISPOSAL SYSTEM FOR MIAMI UNIVERSITY, OXFORD.

This system involves intermittent filtration, the separation of the sludge, and the treatment of the liquid sewage in sand and gravel beds and trenches.

1. The system includes a brick sewage tank, containing distributing and siphon chambers, a separate sludge vault of stone or brick, and a plan of sand and gravel pits and trenches combined with a connected set of common tile drains, the whole joined with the sewer line already constructed from the University.

2. The sewage tank is to be made of brick cemented so as to be water-tight. It is to be made of the dimensions and form given in the accompanying plans, six feet deep between arch and floor. In the latter is to be set, according to special instructions, a Van Vranken automatic siphon for intermittent filtration. The siphon chamber is to be four feet square and three feet deep, capacity forty-eight cubic feet or 360 gallons.

The distributing vault is to be four feet by three feet by three feet six inches, capacity forty-two cubic feet. It is to be connected with the siphon by an iron screen of one inch mesh two feet wide and set in the brick wall so as not to leak, but removable for cleaning.

At the rear end is to be placed, as shown, an overflow pipe and ventilating shaft with iron lamphole cover, set as customary. About the center of the arch is to be made a manhole opening with iron cover.

The Van Vranken siphon, and iron manhole and lamphole covers are to be furnished by the University.

The floors are to have a proper fall for the exit of sludge and liquid sewage. An eight-inch pipe is to pass through the center of the partition wall for drainage, closed with valve or screen.

Soft brick are to be rejected. Portland cement is to be used, and there is to be no leakage either way. Walls are to be one brick thick, and the roof is to be arched over except the manhole opening which is to be properly built in.

The floor is to be made with suitable fall towards the exit pipes for drainage, and at the sludge exit is to be placed an eight-inch valve of iron for emptying of the sludge.

The screen may be made according to the accompanying sketch, or in such a way as may be agreed upon to be effective.

The handle of the iron valve is to extend upwards, being boxed in and be within reach from the surface of the ground.

In finishing, the surface is to be graded off to correspond with the manhole cover.

Sludge Vault—This is to be built in a similar manner to the sewage tank, and with the dimensions given in the plans. Eight inch walls are to be used, unless the contract calls for stone, in which case the walls are to be one foot thick. Some arrangement for ventilating is to be used. The top is to be arched over with brick except an opening four feet, six inches long, at the lower end for removal of the sludge. Inside steps are to be placed at this end to facilitate cleaning, and as shown on the plans. When done, the surface is to be graded to correspond with the top of vault.

Trench System—The liquid sewage is to be emptied on a bed and trench system filled with sand and gravel, grading from coarse gravel on the bottom, to finer gravel and sand, and the top eight inches is to consist of the finest sand obtainable. No gravel larger than hen's egg size is to be used.

Trenches and beds are to be dug out of the dimensions shown in the plans, three feet deep, and the drains are to be three feet, six inches deep leading to a terminal pit filled with coarse gravel, or small stone, and six inches in diameter and four feet deep.

As the making and filling of these beds is an important part of the filtration system, it is to be done under supervision and carried out in the manner required.

The drain tile is to be six inches in diameter in the branches and eight inches in the main part. It is to be properly laid for the purpose of carrying off all water coming to it from whatever source, and it is to end in a gravel pit.

A portion of the dirt removed is to be used in raising the ground where the sewer pipe will enter the beds to the height of a foot and a half above the beds, for the purpose of securing a suitable outflow on the surface of the bed.

The trenches and bed are to be filled heaping full of sand and gravel.

Sewer Line—The additional line required (about 300 feet), is to be of eight-inch pipe, average depth about three feet, and laid with cemented joints. It is to be paid for at the rate of ——— cents per linear foot.

Excavation, Etc.

Excavation of sewage tank	9 ft. 4 in. by 6 ft. 4 in. by 8 ft. 8 in.;	16 cu. yd.
" sludge vaults	23 ft. 4 in. by 6 ft. 4 in. by 9 ft. 6 in.;	52 cu. yd.
" gravel bed	30 ft. by 16 ft. by 3 ft.;	53 cu. yd.
" trenched, three	150 ft. by 2 ft. by 3 ft.;	153 cu. yd.

Total excavations as above, 221 cubic yards. Sand and gravel needed, 153 cubic yards. Surplus earth and stone to be left at our disposal.

LOCATION AND DATA, SEWAGE DISPOSAL.

Distance of beds from High street, 750 feet; from nearest proposed house, 675 feet.

Distance from Wood street, 440 feet; from East Exterior street, 660 feet.

Distance from nearest existing house, 850 feet. Distance from The Retreat, 1,500 feet.

Data. Capacity of distributing chamber, 42 cubic feet.

Siphon chamber, 360 gallons.

Sludge vault, 600 gallons.

Filtration area, 7,392 square feet; sand surface, 1,380 square feet.

Amount of excavation required, 221 cubic yards. Amount of sand and gravel needed, 153 cubic yards. Length of sewer line additional, about 300 feet. Estimated cost, $————.

Ohio State Board of Health,
Office of the Secretary,
Columbus, August 21, 1897.

Dr. W. O. Thompson, President Miami University, Oxford, Ohio.

Dear Sir: The State Board of Health has considered your application for approval of plans for a sewage disposal system for the use of Miami University at Oxford, and you are hereby notified that said plans have been approved. In this connection I wish to quote you what one of the members of the Board has to say in regard to this matter. "The blue print plans seem to show that the sediment chambers or basins are to be covered over. Now, so far as my knowledge goes, there has always been objection found to confine air space over collections of sewage. That was certainly true at East Orange. On the other hand, where the surfaces of such collections in open tanks or vats have been left open and freely exposed to the atmosphere, I do not remember of having heard any complaint. Whether it would be feasible to have these tanks thus exposed or not I do not know. So far as experiment goes there is in respect to temperature not much danger of freezing; in fact, none at all so far as I know. Sewage is delivered into these spaces generally at a considerably higher temperature than freezing point, so that if removal occurs within a reasonable time the danger from freezing is very small. Also the danger of such collections becoming a nuisance to contiguous areas by reason of exposure to air is very small."

Yours truly,
(Signed) C. O. Probst,
By order of the Board. Secretary.

REPORT ON SEWERAGE FOR MIDDLETOWN.

To the State Board of Health:

Gentlemen: Request having been made for the approval of the outlet of a trunk sewer for the city of Middletown, the undersigned committee visited that city on November 19, 1896, and begs leave to report as follows:

In company with the city solicitor, Mr. B. Harwitz, and the consulting engineer, Mr. L. A. Dillon, we walked over a part of the route of the proposed sewer and visited the site of the outlet. For the present a trunk sewer, about a thousand feet in length, is to be built for the special purpose of affording an escape for storm waters from a low lying district which cannot be drained by surface drainage. The sewer, which is egg shaped, is 7 feet, 3 inches by 4 feet, 10 inches at the outlet, and decreases to 5 feet by 3 feet, 4 inches. Lateral sewers, to be built later, are a part of the plan. Both sewage and storm water (the combined system) will be carried.

Middletown is already partly sewered, the combined system being in use, and the engineer claims that the topography is such that surface water must be carried off by sewers, and that the combined system is therefore best adapted to their needs.

The outlet of this proposed sewer is at the Big Miami river nearly on a line with Grand avenue. At this point the river has passed the city, and there are no houses in the neighborhood. The land is low and not well adapted for building purposes, and it is improbable that there will be building going on in this direction for years to come.

There are now three sewers discharging into the Miami river above the outlet of the proposed sewer—one at West Ninth street, a thirty inch brick sewer; one at Fifth street, a three and one-half foot brick sewer;

and one at Second street, a six foot stone sewer. The grades are such that it is easily possible to provide an intercepting sewer to collect the dry weather flow of all the sewers and carry it near to the outlet of the proposed sewer, whence, by pumping, suitable land for land purification may be reached close at hand.

It was planned to stop the proposed sewer several hundred feet short of the river, a ditch being provided to carry the sewage into the river. The committee objected to this, but suggested that a half sewer, with smooth bottom, might be substituted for the ditch.

The Big Miami river is not used for a public water supply below Middletown. For some years to come it is likely that the proposed sewer will carry but little household drainage, and your committee respectfully recommends that the outlet of the proposed sewer be approved, provided the city of Middletown will agree to purify its sewage in a satisfactory manner whenever such purification shall be deemed necessary by the State Board of Health.

Respectfully submitted,

BYRON STANTON,
C. O. PROBST,
Committee.

OHIO STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
COLUMBUS, December 14, 1896.

B. HARWITZ, Esq., City Solicitor, Middletown, Ohio.

DEAR SIR: The State Board of Health has considered your application to approve the outlet of a proposed trunk sewer, to discharge into the Big Miami river on a line, or nearly so, with Grand avenue. The Board wishes to discourage the discharge of raw sewage into running streams, and views with approval the plan of ultimately collecting all the sewage of Middletown at one point for the purpose of purification. Having in view the fact that the proposed sewer will carry but little household sewage for some years to come, the outlet has been and is hereby approved, subject to the proviso that the city of Middletown will agree to purify its sewage in a manner satisfactory to the State Board, whenever such purification shall be deemed necessary by the Board.

Yours truly,

(Signed) C. O. PROBST,
Secretary.

By order of the Board.

REPORT ON THE PROPOSED SEWERAGE FOR MT. VERNON.

To the State Board of Health:

GENTLEMEN: Your committee appointed for the purpose of reporting upon the proposed sewer plans for Mt. Vernon, visited that city May 31, 1897.

Mt. Vernon is indeed a most charming place. It is the county town of Knox county, the center of a rich agricultural district, and the seat of manufactories of considerable importance. The growing population, the increase of wealth, and the growing popular understanding of the methods by which comfort is promoted and the public health is assured, have imposed upon the people the consciousness of a need of better conditions of living.

This impulse took shape, first, in the construction of a public water supply. This water is obtained from artesian wells and is apparently, both in respect to quality and quantity, all that could be desired.

The city lies on the banks of the Kokosing river, and the situation, as to sewers, is about as follows: The town plat is divided into four sewer districts, each tributary to its own main sewer, and numbered 1, 2, 3 and 4. The river enters the city through district No. 4, thence, passing down stream, the districts, consecutively, are No. 3, No. 1 and No. 2.

It is not proposed to sewer districts 3 and 4 for the present. The territory comprising district No. 1 is a long, rather narrow ridge which bisects the city, and through the central part of which passes its most important street. With a view to paving this street a combined sewer was placed in it a number of years ago, its outlet being into the Kokosing under a bridge in a central part of the city. Owing to this sewer's greater elevation it cannot be made available for the drainage of any of the other districts. It was, therefore, to the newly prepared plans for the sewerage of district No. 2, the lowest down the river and one of the most important, that the Committee's attention was particularly directed.

The plan comprises between five and six miles of sewers. The latter are to be made of stoneware pipes, will receive only house wastes and cellar drainage, storm and street waters being excluded. The sewage is concentrated into one main a little before reaching the foot of German street, a comparatively high point a few rods from the track of the Cleveland, Akron and Columbus Railway, and thence nearly parallel with its track, to a point about sixty rods distant, and into the Koskosing river. The land between German street and the point of exit is not adapted to city occupation.

The proposed improvement at Mt. Vernon exhibits the phase, characteristic of its locality, of a problem that is constantly being brought to the attention of this Board: How may such needed improvements be made in a manner that is sanitarily unobjectionable, and in a way that harmonizes with the requirements of the laws of Ohio? (See statutes of Ohio, sections 6921, 6923.) No experience could more forcibly emphasize the need of those studies of the surface and underground water supplies of the State, and their possible causes of deterioration, such as more recently have been inaugurated, than a constant contact with projects such as that now under consideration.

The restrictions imposed by Ohio laws (and every state and country has similar laws) for the protection of streams arose from the well founded conviction that sewer products, that organic decay and animal putrefaction, were hostile to physical well-being. When those laws were passed nothing was known of the devastation that is, under favoring circumstances, sometimes wrought by bacterial life. Large volumes would no more than suffice to present the examples of detriment to health and life that have been derived from a sewer exit such as either that already existing, or the one now proposed at Mt. Vernon. Those laws were enactments against filth pollution; as safeguards against the distribution of the seeds of specific infectious diseases the scope of their wise beneficence is very greatly enlarged.

Viewing this project only so far as it has for its purpose the removal of objectionable waste matters from sewer district No. 2, the plan of City Engineer Cassel is all that could be desired; but it is the duty of those who are appointed to supervise the sanitary interests of the State to have a due regard for the welfare of all who may be affected. The removal of the organic wastes from the inhabited area by means of sewers, as already intimated, is a most wise sanitary precaution and ought not to be delayed. The plan proposed, however, looks only to direct benefits to the residents of the sewer district; it loses sight of the provisions of law applicable to such cases, and of the rights of other riparian owners, lower down on the river, whose title to have the Kokosing river water in its natural state, unpolluted by special defilement, is clear both in right and in law.

That the proposed sewage effluent would cause a harmful pollution of the stream will not be disputed. Fortunately the point at which the main sewer leaves the populated area—the foot of German street—is well elevated above low lying lands both nearby and farther down stream. This fact suggests the expediency of treating the effluent by filtration, or by such other process as will eliminate the filth and micro-organisms before passing through the city; and the situation favors the ultimate collection of the sewage of the other three districts, by means of an intercepting sewer, and its concentration at the foot of German street. In pursuance of such a plan the sewage of the entire city may be economically disposed of by some method that will be satisfactory both to the city and to others below who now have, or may hereafter have, rights that would otherwise be jeopardized.

Therefore, in view of the situation, of the legal aspects of the case, and of the welfare, present and future of all concerned, it must not only be implied, but clearly understood that if the temporary use of the sewer exit as proposed in the plan is permitted, the same is only conditional; that said permit carries with it the right of the State Board of Health to suppress the use of said sewage exit at such time as the same becomes a menace to the health of other residents and owners of the Kokosing waters.

With these modifications in mind, and in view of the fact that, at present, the waters passing by Mt. Vernon are used as a public water supply only after flowing a distance of seventy-five miles, the committee recommends the temporary approval of the sewer plan for District No. 2 at Mt. Vernon.

Respectfully submitted,

THOS. C. HOOVER,
JOSIAH HARTZELL,
Committee.

OHIO STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
COLUMBUS, July 14, 1897.

MESSRS. E. J. MCFEELY, L. F. WEST, WM. H. COE, Sewer Committee, Mt. Vernon, O.

DEAR SIRS: The State Board of Health has considered your application for approval of plans for sewer district No. 2 of your city, comprising some five or six miles of sewers from which storm water is to be excluded, and having an outlet into the Kokosing river.

You are hereby notified that said plans have been approved subject to the condition that this approval shall be considered as temporary, and that the sewage shall be purified in a satisfactory manner when in the judgment of the State Board of Health this shall become necessary.

Respectfully,
(Signed) C. O. PROBST,
Secretary.

By order of the Board.

REPORT ON THE PROPOSED SEWERAGE SYSTEM FOR NILES.

To the Ohio State Board of Health:

GENTLEMEN: I visited the town of Niles April 28th. The plan of the proposed sewer system exhibited by the City Engineer comprises sewers approximating five miles in length. The sewers are designed to receive storm water, house and factory wastes, and cellar drainage.

The plan proposes the collection of the contents of all the lateral sewers at a low point inside the town, by means of pipes from eight to twenty inches in diameter. From this point nearly all the sewage is to pass through an egg-shaped brick sewer averaging about three feet in round diameter, approximately 1,000 feet to the Mahoning river. It is this outlet into the river for which the approval of this Board is desired. It is also a point well within the corporate limits of the town.

The plan shows an added length of main sewer, reaching from this proposed present outlet to a point about one and one-half miles below on the river, and well beyond the closely inhabited district. It is intended that this proposed additional main sewer shall accommodate the normal, dry-weather flow from all the sewers, the increase of volume from storms being permitted to escape by an overflow at this sewer's upper end, which is the point of the proposed present outlet of the sewers into the river.

The estimates of probable water closet connections to sewers in the near future made by city officers varied from 40 to 150. About 1,000 feet of pipe sewer, passing under a paved street and discharging into the river, is now in operation. On this sewer, passing through a thickly settled district, there are eight house connections. Prompt action of this Board was urged on the ground that many cellars needed drainage and that additional street paving was desired, rather than on the ground that the removal of house wastes had become a sanitary necessity. There are also surface depressions holding water the year round for which the sewer would be a remedy. The town has a water supply, derived from wells, which, it is claimed, is ample in quantity and of good quality.

The population of Niles is about 7,000. It is situated about six miles below Warren and ten miles above Youngstown, by the river routes. Owing to a dam six miles below, the water in the channel is deepened and its flow slacked to a point one and one-half miles above the town site. At the river's ordinary stage the water flow at the proposed outlet is sluggish—in times of high water, the velocity of the current is greatly accelerated.

The towns above Niles deriving public water supplies from the Mahoning are Alliance and Warren. The sewage from the Alliance system is treated by chemical precipitation before being admitted into the stream. The sewage of Warren goes into the the river in its crude state. The only city in the state of Ohio, in addition to the above, which takes its water supply from the Mahoning — also discharging its sewage into the river—is Youngstown. As already stated, Niles has an underground source of water, the same being obtained from wells. The question now presents itself: Ought the crude effluent from the Niles sewers to be admitted into the river at the proposed present outlet, or at the proposed future lower outlet?

The befouling of water courses is expressly forbidden by the laws of Ohio. Prior to the establishment of the state and local boards of health the pollution of streams by sewage was in some instances tolerated; never legally sanctioned. The direct approval of such a course by a legally constituted authority is a very different thing. Has this Board the power to give to such sewage disposal as is requested by the authorities of Niles any sanction that is permanently valid in law?

Without undertaking to solve a problem in sanitary engineering, it may be said that one of two courses of action suggests itself, viz.: either use the proposed system for storm water and cellar drains exclusively, and introduce a small pipe, separate system for house sewage, to be purified before delivery; or at once complete the present combined system, including overflow, and added main sewer to a point below the town. This plan has the advantage of delivering the effluent at one point where some process of purification or filtration would fit the same for delivery into the river.

During my visit the proposed present outlet was frequently characterized as temporary. It must be perfectly evident that an outlet, approved without restriction as to methods or time, so far as the action of this Board is concerned, is not temporary, but permanent. I am compelled to recommend its disapproval.

Respectfully submitted,

JOSIAH HARTZELL,
Committee.

OHIO STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
COLUMBUS, May 10, 1897.

Mr. W. Y. SAYERS, Secretary, Sewer Commission, Niles, Ohio:

DEAR SIR: The State Board of Health has considered your application for approval of a system of sewerage for storm water and house drainage, with an outlet sewer to the Mahoning river, and I am directed to say that the plans have been disapproved.

Yours truly,

(Signed) C. O. PROBST,
Secretary.

By order of the Board.

REPORT ON SEWAGE DISPOSAL, SHEPARDSON COLLEGE, GRANVILLE.

To the Members of the State Board of Health:

DEAR SIRS: The Trustees of Shepardson College at Granville desire the approval of this Board for a system of sewerage and sewage disposal works.

At the present time the sewage is disposed of in cesspools which are near the buildings and which require frequent emptying.

It is proposed to conduct all sewage by a six inch sewer to land just outside of the corporation and about 1,800 feet from the college buildings. This land may be reached by gravity and is composed of about three feet of sandy loam overlying a bed of gravel. The effluent would be carried through a drain tile to Raccoon creek several hundred feet from the filter beds. The nearest beds would be not more than 500 feet from several dwellings. At the present time there would be sewage from less than one hundred persons to care for, and it is stated that the number of persons using the sewers would never exceed two hundred. Furthermore, during the months of June, July and August, vacation time, there would be little or no sewage to dispose of.

Plans have not been prepared, as the Board of Trustee did not authorize this improvement until the 19th of April.

It is proposed to prepare filter beds of not less than one and one-half acres in area. While I am of the opinion that it would be better if the proposed filter beds were further removed from habitations, in view of the small amount of sewage to be cared for, and the comparatively large filtration area to be used, there is reason to believe that the sewage may be purified as proposed without nuisance and in a satisfactory manner. I would therefore recommend that permission be granted to commence the work with the requirement that plans showing the size and arrangement of filter beds and manner of distributing the sewage be furnished the Board before the work is completed or final approval is given.

An early decision is very necessary in this case,

Respectfully,
C. O. PROBST,
Secretary.

OHIO STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
COLUMBUS, April 27, 1897.

DR. D. B. PURINTON, President, Shepardson College, Granville, Ohio.

SIR: The State Board of Health has considered your application for approval of a system of sewerage and sewage disposal for Shepardson College, and you are hereby notified that the plans have been approved.

The plans do not show the manner in which the sewage will be applied to the filter beds, and we would urge that the greatest care be taken to prepare the beds so as to prevent ponding of the sewage, from which imperfect filtration and bad odors would be liable to result.

We would also urge, if the land is to be used without stripping, that the entire filtration area, as provided in plans, be utilized, each bed being given the longest attainable period of rest between doses of sewage.

Very respectlully,
(Signed) C. O. PROBST,
Secretary.

By order of the Board.

REPORT ON SEWAGE PURIFICATION AT THE HOSPITAL FOR INSANE, TOLEDO.

At a meeting of the State Board of Health, held in Columbus, O., January 20, 1897, the following plans for sewage purification at the Toledo Hospital for Insane were submitted:

To the Honorable Board of Trustees, Toledo State Hospital:

GENTLEMEN: I respectfully submit herewith, plans and profiles for the sewerage of your institution, together with plans for the disposal and purification of the sewage by intermittent filtration.

I have made an examination of the present sewerage system with a view to utilizing the same or a portion of it, if possible. I find that as the present system is a combined one, that is to say, providing for the drainage of all storm and subsoil water in addition to the sewage, it will be impossible to provide an adequate system of disposal arranged to treat the whole flow at present passing through the sewer in times of rainy weather.

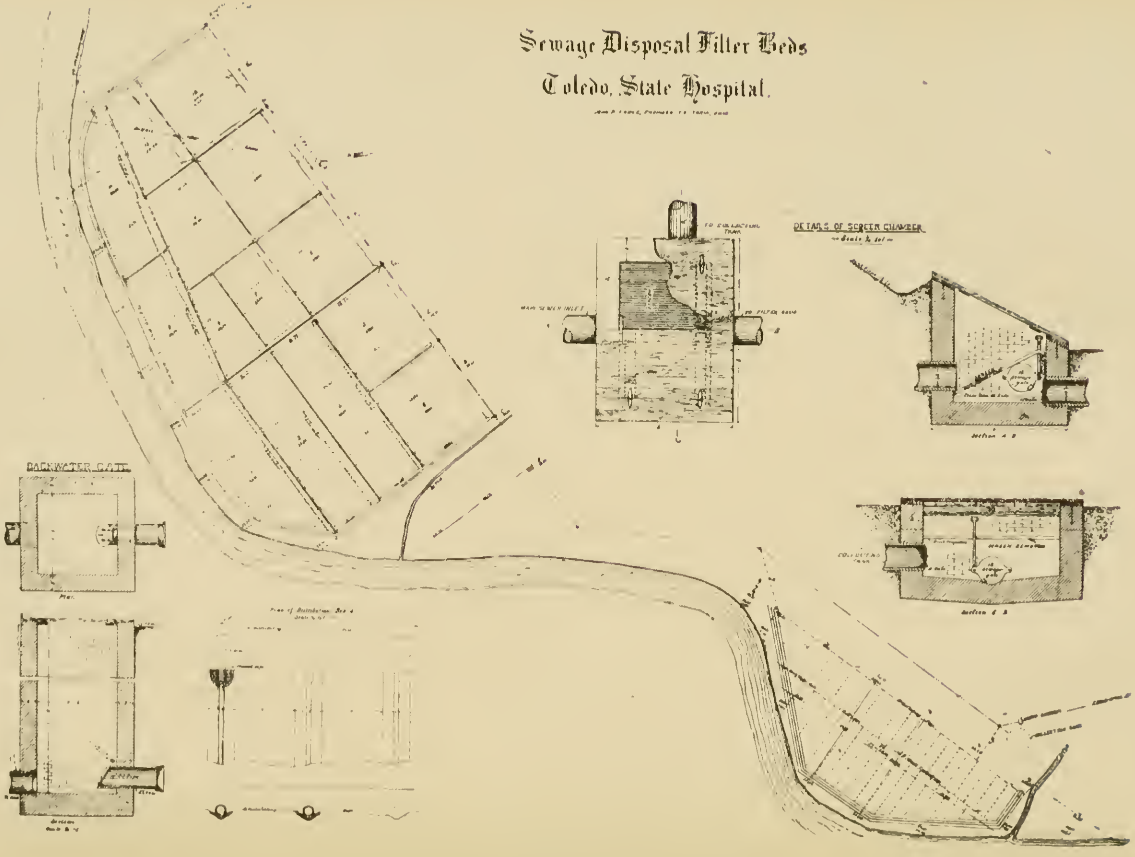
I have considered the project of intercepting the dry weather flow of sewage and providing a storm overflow by which the storm water would be discharged directly into Swan creek. This plan, however, is objectionable for several reasons. One being the depth of the main sewer at the point of interception which would necessitate very heavy cutting for the intercepting sewer through quicksand.

Another objection to this project is that as the underdrainage of the grounds is taken into the present system, the amount of subsoil water is considerable at all times and would largely increase the amount of sewage to be disposed of.

I have placed a weir in a manhole of the present sewer and measured the flow of sewage during dry weather. I found the discharge to be on an average of 250,288 gallons per twenty-four hours; which, placing the population of the institution at 1,500 persons, would give a sewage discharge equivalent to about 166 gallons per capita per diem, which shows that the flow of subsoil water must be considerable.

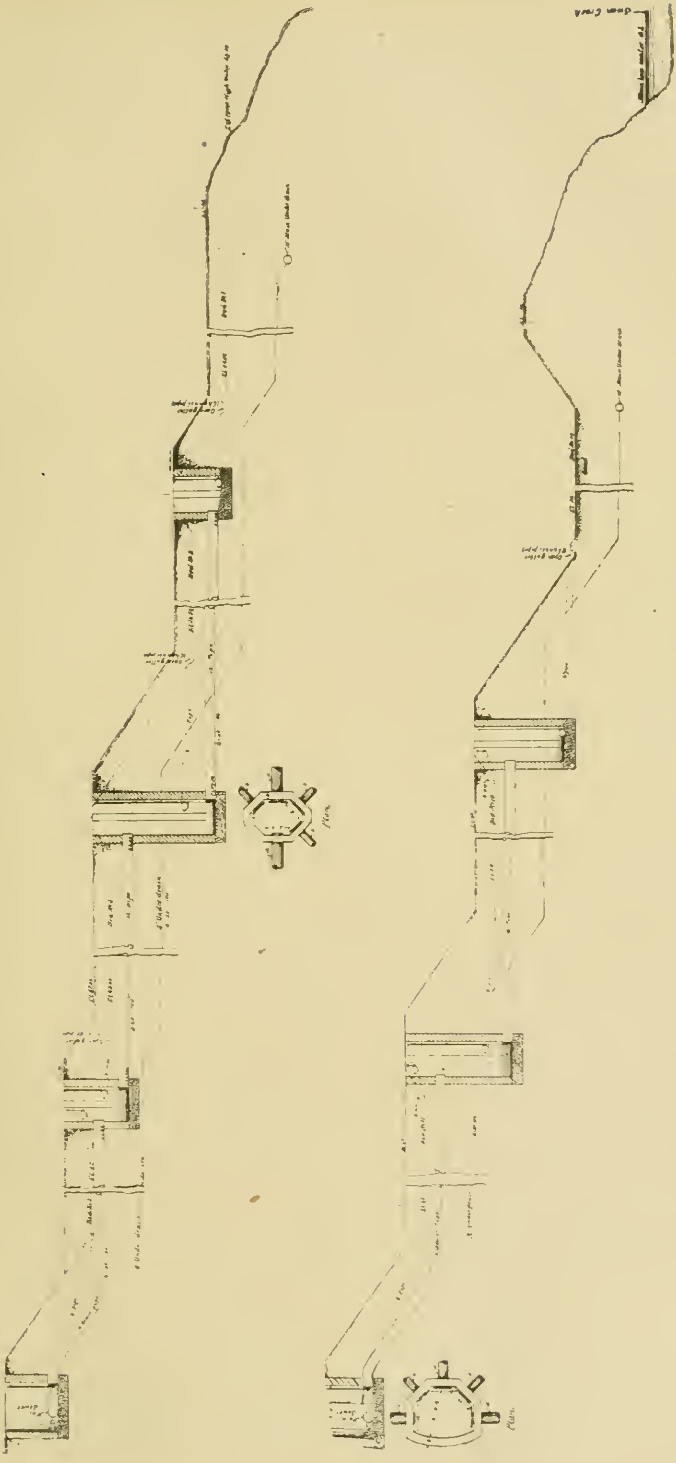
In order, therefore, to reduce the amount of sewage to be disposed of to the minimum, I have arranged a new system of sewers, designed solely for the removal of foul waste from the various buildings, leaving the present system to deal with the storm and subsoil water alone. The new system as indicated on the general plan contemplates the construction of two branch sewers to be laid at the rear of the buildings and joining together in a main sewer at a point between the "M" building and the stable. From this point the main sewer runs in a northeasterly direction to the land selected for filtration areas.

The sewers are to be constructed of first quality salt-glazed vitrified sewer pipe, laid to the grade shown on profiles; the pipes to be jointed with cement mortar composed of one part of American hydraulic cement to one part of sand, applied by the hand and not trowelled on. I would recommend the use of gaskets of oakum, to be introduced into the annular space between the spigot and socket at each joint and caulked in before the cement is applied. This is an important precaution to be observed in laying small pipes to prevent the introduction of mortar within the pipe and to secure a tight joint. As an additional precaution to prevent sand or other material from being left in the pipes, and especially if the trench be wet or in running sand it would be well to use a swab of sufficient size to completely fill the pipe and with a rod or rope attached of sufficient length to pass two joints. This swab can be drawn forward by the pipe layer as the work progresses and should be removed only for an occasional cleaning. I have indicated on the plan manholes at each change in grade or direction with others at intermediate points where the distance is great. These manholes are to be constructed of brick, laid in cement mortar and capped with a suitable cover at the surface. The walls are to be eight inches in thickness and the invert of the sewer to be carried through by channels properly formed in the bottom; all changes in direction and inverts of connecting sewers to be worked off by easy curves. These manholes are to be four feet in diameter at the bottom to admit of room for a workman to use the proper tools if it should ever be necessary to remove obstructions in the sewer.



Sewage Disposal Filter Beds

Toledo, State Hospital.



Profiles of Sewage Carriers. Toledo State Hospital, Sewage Disposal.

At the head of each sewer I have located a flush tank. These are to be constructed of brick four feet in diameter. Within the tank is to be placed a Van Vranken automatic syphon, having a diameter of five inches and a height of thirty inches. These tanks are to be supplied from the water main and the amount of water regulated by a cock. The syphons are entirely automatic and require no attention, the length of time between each discharge being regulated entirely by the amount of water supplied.

The size tank I have recommended will hold 232 gallons of water when full, which will be discharged by the syphon in forty-five seconds.

If these tanks are supplied with sufficient water to discharge once in twelve hours the entire system will be greatly benefited as all stranded particles near the head of the sewers, where the flow is light, will be swept along with the current and thus insure the delivery of sewage in a fresh state at all times at the disposal areas.

In making connections from the buildings to the new sewers the soil pipe should be disconnected from the roof water channels and the connection made directly with the new sewer at a Y branch, using easy bends at all changes of direction and dispensing altogether with the use of a trap on the house sewer.

With a properly designed and constructed sewer system these traps on the main drain are unnecessary and prevent a free circulation of air from the sewer up through the soil pipe, which is the only rational means yet discovered to properly ventilate a sewer and prevent the accumulation of foul gases. I would strongly recommend also the removal of the cowls which are at present upon all soil pipes of the various buildings. In fact, nothing should intervene to prevent a free circulation of air. It would be well at the time the changes are made to test all soil, water and vent pipes for leaks and correct all defects.

An estimate of the cost of the proposed sewer system is hereinafter given apart from the cost of the sewage disposal works.

The sewers start at the upper end at the flush tanks, six inches in size and with a fall of .40 of a foot per hundred feet, increasing to eight inches at a point where the laundry and kitchen sewers are connected. The west side sewer has a fall of .30 of a foot per 100 feet to the main sewer. The east side sewer is increased to eight inches in diameter at the administration building, and has a fall from thence to main sewer of .25 of a foot per 100 feet. The main sewer is twelve inches in diameter and has a fall of .30 of a foot per 100 feet throughout its entire length. The sewers are designed to carry the maximum flow while running only half full, and are made large enough to provide for a population twice as large as the present one. At the point where the main sewer cuts through the brow of the bluff at Swan creek on its way to the disposal areas, I have located a screen chamber and a collecting tank. The screen chamber as shown on plan is to be provided with a screen formed of wrought iron bars spaced three-fourths of an inch apart. This screen will intercept all large objects, paper, rags, etc., passing through the sewer which would be objectionable on the disposal areas. The screenings can be removed from time to time by rake and burned. After passing through the screen chamber the sewer drops six feet to the first gate chamber. This drop provides an opportunity for the construction of a collecting tank holding sewage at a depth of six feet.

I have provided for the future construction of this tank; but do not deem it wholly essential to the proper working of the system, and believe that a trial should be made of the system without the tank. It can be added at any future time if found necessary. If the sewage is needed for irrigating the field above the level of the highest point to be reached by gravitation, the tank can be constructed and used for a reservoir to pump from as well as for a collecting tank. A collecting tank forty feet in diameter, holding 54,000 gallons, would cost about $1,500.

I have examined the soil on the site selected for the disposal of the sewage, and find it a fine, even grain sand for the most part. I consider the material well adapted for a high grade of purification if the doses of sewage are properly applied and regulated so as to give each area sufficient rest. I have made topographical surveys of the ground and divided it as shown on the plan into fifteen separate areas. These plots are to be divided by slight embankments and the surface leveled off. The whole field to be underdrained with hard burned tile laid to a depth of five feet, spaced twenty feet apart.

This underdraining should be carefully and systematically done, as I consider it of great importance. On account of the fineness of the material every facility should be given for the drainage of the effluent water as rapidly as it will percolate through the soil, thus giving the air a chance to enter the soil and support the micro-organisms that perform the work of purification. The underdrains are to discharge into a main drain which is to be constructed of vitrified pipe. Connections between the main drain and branch drains are to be made at Y branches with one-eighth bends of sewer pipe. In laying the drains the joints should be wrapped with muslin or tarred paper, to exclude sand while the trench is being refilled, and until the material is settled into place around the pipe. In refilling underdrain trenches the material should be tamped with heavy rammers.

If clay is encountered in digging trenches for underdrains, it should be removed and replaced with sand. I found clay in one test pit at a depth of four and one-half feet, but do not believe that it will be encountered as a general thing at that depth. There is a small surface water ditch at present crossing at a point to be occupied by filter bed No. 11. This ditch should discharge into a catch basin provided with a grating located above the filter bed and the water be conveyed to the creek through a twelve-inch pipe laid through the bed as indicated on plan. The total area to be prepared for filtration after deducting the space occupied by embankments amounts to 6.92 acres.

It is proposed to discharge the sewage on beds Nos. 4, 5, 6, 7, 8, 10, 11, 12 and 13, at the corners of the beds, and distribute the sewage by furrows ploughed across the beds. Filter beds Nos. 1, 2, 3, 9 and 14 are necessarily long and narrow, and to effect a more perfect distribution of the sewage are to be provided with open gutters formed of channel or one-half pipe laid along the side of the beds. Filter bed No. 15 is to be arranged with a distributing pipe laid along its length, provided with T openings every eleven and one-half feet, which will discharge into short lengths of the channel pipe, which in turn will communicate with carrier ditches, effecting in this way the distribution of sewage over the surface. The discharge of the sewage onto the different beds will be regulated by gates of a simple pattern, located in small brick gate chambers, located as shown on drawings. The gate chambers located at the intersection of embankments are to be octagonal in plan; all others to be square.

The discharge from the filtration areas to the nearest building occupied as a dwelling, which is the house north of the stable, is 890 feet.

The distance from the filtration areas to the "M" building is 1,160 feet.

These filter beds are all arranged so that they may be cultivated and the crops grown on them will be found to thrive extremely well notwithstanding the character of the soil.

As it is proposed to do the work by the labor of the inmates and regular employees of the institution, I have made no estimate of the cost of labor. Below is an estimate of the cost of, and a list of the materials necessary for the sewers and filter beds.

Estimate of Cost of Sewers.

2374 feet, 4 in. sewer pipe at 20 cents	$474 80
2468 feet, 6 in. sewer pipe at 30 cents	740 40
2414 feet, 8 in. sewer pipe at 45 cents	1,086 30

2727 feet, 12 in. sewer pipe at 85 cents	2,317 95
49 4 in. ⅛ bends at 65 cents	31 85
3 4x4 Y's at 90 cents	2 70
12 4x6 Y's at $1.35	16 20
1 4x12 Y	3 83
	$4,674 03
Less 85 per cent. discount	3,972 92
	$701 01
25 M brick at $6	150 00
90 bbls. cement at 90 cents	81 00
18 cu. yds. sand at $1	18 00
22 manhole covers at $7	154 00
2 automatic syphons at $25.20	50 40
Plumbing on new house connections	250 00
5 bbls. Portland cement at $3.50	17 50
	$1,422 91

ESTIMATES OF COST OF SEWAGE DISPOSAL.

1480 feet, 12 in. pipe at 85 cents	$1,258 00
1330 feet, 12 in. channel pipe at 51 cents	678 30
870 feet, 8 in. pipe at 45 cents	391 50
914 feet, 10 in. pipe at 65 cents	594 10
40 feet, 10x4 Y's at $2.48	99 00
40 feet, 8x4 Y's at $2.03	81 20
80 feet, 4 in. ⅛ bends at 65 cents	52 00
48 feet, 12x12 T's at $3.83	183 84
	$3,337 94
Less 85 per cent. discount	2,837 24
	$500 70
13 12 in. sewage gates at $9.00	117 00
30 8 in. sewage gates at 6.00	180 00
2 back water gates at $10.00	20 00
1 screen	20 00
18 M. 4 in. drain tile at $14.00	252 00
30 M. brick at $6.00	180 00
75 bbls. cement at 90 cents	67 50
4 bbls. Portland cement at $3.50	14 00
25 cu. yds. sand at $1.00	25 00
Incidentals	50 00
	$1,426 20

TOTAL ESTIMATED COST.

For sewers and connections as above	$1,422 91
For sewage disposal as above	1,426 20
	$2,849 11
If collecting tank is constructed, add	1,500 00
	$4,349 11

Stakes have been placed along the lines of sewers to indicate their location. The grade should be carefully set with a proper instrument for each section of not more than 25 feet as the work progresses. The best way to set the grade for the work will be to carry a parallel grade above the surface on boards fastened firmly across the trench. Over these boards and at the center of the trench, stretch a mason's line tightly, and each pipe can be graded truly, as laid, by measuring the proper depth from the line to the invert of the pipe with a graduated rod shod on the lower end with a right angle of iron. The grade line shown on profiles, refers to the elevation of the invert or inner bottom line of the pipe. Bench marks referring to the arbitrary datum used in the surveys, are established as follows: On sill of south basement window on west side of new addition to "L" building, elevation 95.89. On south end of 5th step in front of administration building, elevation 97.916. On sill of south basement window west side of Cottage K, elevation 96.41.

On the land selected for filtration stakes have been placed 100 feet apart in parallel rows, and marked as indicated on plan. The figures given on plan, in red ink, refer to the elevation of the top of each stake, and the level of each bed can be fixed as the work progresses, by subtracting its elevation from that given for the nearest stake, and measuring the cut given this way, from the top of the stake. The proper location of the embankments, can be secured by measuring distances from the same stakes. Grades should be carefully set for the drains as the work progresses.

Respectfully submitted,

JOHN P. FORCE,
Engineer.

FOSTORIA, O., December 17, 1896.

DATA AND DIRECTIONS FOR APPLYING SEWAGE ON FILTER BEDS AT THE TOLEDO STATE HOSPITAL.

The total area to be prepared, after deducting space occupied by embankments, etc., is 6.92 acres.

The estimated flow of sewage from the institution after the new sewers are constructed and sub-soil water is excluded is 150,000 gallons in 24 hours. It is expected that this amount, 100,000 gallons, will pass off from 6 A. M. to 8 P. M., a period of 14 hours, and that the balance of 50,000 gallons will pass off in 10 hours. This 50,000 gallons will be the night flow and will be greatly diluted, consisting principally of flush water from the flush tanks and closets. As a matter of convenience filter bed No. 15 has been arranged to receive the night flow. The daily flow may be distributed on the various beds in the following order:

No. of Bed.	Area in acres.	Gallons daily.	Time of application.	Hours of rest.
1	.50	9,259	55 Min.	23 hrs. 5 Min.
2	.46	8,519	50 "	23 " 10 "
3	.52	9,631	58 "	23 " 2 "
4	.41	7,593	45 "	23 " 15 "
5	.41	7,593	45 "	23 " 15 "
6	.41	7,593	45 "	23 " 15 "
7	.26	4,815	30 "	23 " 30 "
8	.17	3,141	20 "	23 " 40 "
9	.40	7,408	44 "	23 " 16 "
10	.37	6,859	40 "	23 " 20 "
11	.44	8,149	50 "	23 " 10 "
12	.44	8,149	50 "	23 " 10 "
13	.26	4,815	30 "	23 " 30 "
14	.35	6,482	38 "	23 " 22 "
15	1.52	50,000	10 hours	14 "

It is not expected that the beds will always be flooded in the order or for the exact time given in the table. Two or more beds can be flooded at the same time by only partially opening the outlet gates. At some seasons of the year it may be necessary to leave certain beds out of use during planting and cropping. It should be stated, however, that the more regularly the sewage is applied to each area, the better will be the results. At the rate given for application of sewage in the table, each area in the beds from No. 1 to No. 14 inclusive would receive 18,518 gallons of sewage each 24 hours. Bed No. 15 would receive 32,236 gallons per acre each 24 hours of the diluted night flow. The soil is capable of treating at least 40,000 gallons of sewage per 24 hours with good results. Hence it will be seen that the area provided will be sufficient for a large increase in the population of the institution.

JOHN P. FORCE,
Engineer.

OHIO STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
COLUMBUS, February 3, 1897.

To the Trustees of the Toledo State Hospital for Insane, Toledo, Ohio.

DEAR SIRS: The State Board of Health has considered your application for approval of plans for the disposal of the sewage of the hospital by the means of intermittent filtration, as shown by plans prepared by Mr. J. P. Force, your consulting engineer, and you are hereby notified that said plans have been approved.

Yours truly,
(Signed) C. O. PROBST,
Secretary.

By order of the Board.

REPORT ON PROPOSED SEWERAGE FOR WYOMING.

To the State Board of Health,

GENTLEMEN: By request of the council of Wyoming I visited that village on April 2d, and looked over the ground with reference to the introduction of sewerage.

Wyoming is a village of about 2,100 inhabitants, with about 350 houses, and having an excellent public water supply. Part of the village is sewered for storm water, some household drainage being admitted to the sewers. During recent heavy rains these sewers have proven to be entirely inadequate and the streets have been severely flooded.

Plans for the proposed new sewerage system have not been prepared and the council is unwilling to move in the matter until informed as to the position this Board will take with reference to the sewer outlet.

It is proposed for the present to construct about five miles of combined sewers with an outlet sewer into Mill Creek at the upper part of the village.

Near the proposed outlet is about an acre of ground of a gravelly character, where chemical precipitation with filtration of the effluent might be provided for, though not, I should judge, (no levels having been made, however,) without pumping the sewage.

The villages of Lockland and Hartwell, which touch the boundaries of Wyoming, are below the proposed outlet and would be to some extent affected by the pollution of Mill Creek.

It is urged that this stream is already an open sewer, and that the small amount of sewage Wyoming would contribute will not materially change its character.

The pollution of this stream has been a crying evil for many years, and in my opinion it is time to call a halt and take steps steps for its reclamation. I would therefore recommend that the proposal of Wyoming to turn crude sewage into Mill Creek be disapproved.

I would also recommend that the suggestion be made to the council of Wyoming that the combined system of sewerage should not be adopted unless shown by careful investigation, to be necessary.

Respectfully submitted,
C. O. PROBST,
Secretary.

OHIO STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
COLUMBUS, April 16, 1897.

MR. CHARLES EWING C. E., Wyoming, Ohio.

DEAR SIR : The State Board of Health has considered your application for approval of a sewerage system for the village of Wyoming, an outlet into Mill Creek, and you are hereby notified that said outlet has been disapproved unless provisions are made for satisfactory purification of the sewage.

Yours truly,
(Signed) C. O. PROBST,
Secretary,

By order of the Board.

REPORT ON THE SEWERAGE SYSTEM OF YOUNGSTOWN.

To the State Board of Health:

GENTLEMEN: The board of health of Youngstown, at a meeting held December 7, 1896, adopted a resolution requesting the State Board of Health to investigate and report upon the sewerage system of that city. The undersigned committee was appointed to make the investigation which it did on January 15, 1897, and respectfully reports as follows:

The sewers of Youngstown, which were constructed some years ago, have a linear extension of about twenty-four miles, and effect the house and storm water drainage of the most densely populated part of the city, the combined system being used. The records of the engineer's office show 1,240 sewer connections. A good many expressions of regret were heard over the fact that separate sewers had not been built. The shallowness of the sewers on a few streets entails certain inconveniences. Very few automatic flush tanks are used. Removal of sedimentation in certain sewers of large diameter has necessitated very considerable expenditures. More efficient measures for flushing have been introduced and give promise of improvement in this respect.

The city water supply is taken, unfiltered, from the Mahoning river at a point some distance above the outlet of the uppermost main sewer. Of the local features which passed under our observation at Youngstown the one calling for critical attention is the manner of present final disposal of the city's sewage effluent.

The committee was afforded ample opportunities for observation. Maps and charts of the sewer routes were exhibited and explained. Carriages were provided in which the committee, accompanied by officers of the city, was conducted to points favorable to an inspection of the sanitary condition. Briefly stated, it was found that all the contents of all the sewers find their way into the Mahoning river. The effluent from one sewer flows directly into the river; two smaller systems reach the river after flowing a short distance through a natural water course; the mouth of the main sewer, seven feet in diameter, opens into Cherry creek at a point only seventy-five feet above its confluence with the main channel of the river. The precipitation of the sewage of Youngstown upon the waters of the Mahoning river is a practice fraught with possible consequences of such importance as to make it worthy of grave consideration.

The Mahoning is the main drainage channel through which the surplus surface waters of the eastern half of the Western Reserve find their way eastward into the Ohio river. The river's flow is exceedingly inconstant in volume, a feature that is due to two causes: First the general geologic formation is not of the kind which furnishes frequent springs of large and constant volume, as in more mountainous regions, and, second, the river is the only outlet for the escape of the storm-waters precipitated over a large area. The range between high and low water if therefore very considerable. Heavy rains are followed by heavy floods. Protracted drouth assures a restricted water flow. The degree of dilution of sewage influents decreases, and the degree of storm pollution increases in proportion to the shrinkage of the volume of current.

The objections to the discharge of the crude sewage of cities into such a stream are so obvious as to suggest themselves to all intelligent persons who have a care for the public welfare. These objections are valid even during comparatively short periods of high water; they are of pronounced significance when the water-flow is at average stage; the lessons of experience conspire to prove that, in times of low water, the practice should be inadmissible.

The casting of sewage into the sea, or into great water bodies where large dilution is effected, is ranked as a sanitary abuse. Even London purifies its sewage of its solids before delivering the effluent into salt water at a point twelve miles distant from the city. In strong contrast with sea and lake coast cities, in this respect, is the situation of cities and towns located on inland streams.

Riparian owners upon the banks of the non-navigable streams of Ohio have a property-interest therein, but it is of a peculiar character. The water in the channel which, at any given moment, is available to the riparian farmer, or corporation, for lawful purposes, passes on, and within the next hour, or day, becomes the temporary property of another. Each owner has a joint right to the use of the same stream. How admirably adapted to this situation is the application of the golden rule. The sewage sinners, however, have perverted that good maxim and by their acts they say, "What I do unto others, do not do that unto me." Another injunction of high authority is equally applicable, viz., the one which commands us to cast the beam out of our own eye in order that we may see clearly to cast the mote out of our brother's eye.

The owners of the stream have the right to have this water exempt from preventible causes of deterioration. It is to the interest of the public health and welfare that the streams of Ohio should be unmingled with matters that are inimical to life and health. This is common law; it is also emphasized by the express provisions of secs. 6923, 6925 and 6927 of the Statutes of Ohio.

In spite of the law, and the clearly expressed mandates of these statutes, it is a fact that the serious pollution of the Mahoning river is going on from day to day, notably by the contribution of influents from the cities of Youngstown and Warren; also by corporations of lesser magnitude that use the river channel as a drain for foul waste matters. It is also a matter of common report that other corporations adjacent to its banks are projecting sewer systems with a view to delivering their contents into the river. In fact, unless the protecting hand of the courts, and of State authority, is interposed, not many years can elapse before the rapidly increasing populations on the margin of the Mahoning will have converted the river, especially at normal and low stage, into a foul and noisome sewer drain.

Having thus briefly exposed present conditions, and the menace of their example to the future, it can be inquired, and with pertinence, whether there is a remedy, and whether the same is feasible. Both these queries can now be answered unequivocally in the affirmative. If any doubt attended the possibility of such an undertaking a score of years ago, that doubt has been dispelled by the continuous and satisfactory operation of wisely constructed works for sewage purification and river reclamation both in Europe and America. The illustration is not so far away as the people of Youngstown may suppose.

Mention has been made of the Warren sewage influent into the river twelve miles up stream from Youngstown. It is true that the municipal authorities of Warren have their own problems to look after; also that, in the present instance at least, they have not solicited attention. But they, and all other owners and users of the river, will recognize the applicability to the subject under review of that which has already been said in regard to the common ownership of the waters of the river by all who live on its banks. These waters are Warren's to-day, tomorrow they become the possession of Niles, of Girard, of Youngstown.

Considerably farther up stream is situated Alliance with a population of fifteen to twenty thousand. Three years ago a very complete system of sewers was built in Alliance. The same was submitted for approval to the State Board of Health, in compliance with the state law of March 14, 1893. Approval was given, but upon condition that the sewage effluent be brought into a condition satisfactory to the Board.

Almost simultaneously with the completion of the sewers, a small sewage stream, alimented by surreptitious attachments, commenced to find its way into the river. Complaint was made of this, not to the health authorities, but to the court of common pleas. By order of the latter the police was directed to suppress this nuisance. The municipal authorities obtained expert advice and constructed works that assure a permanent disposal that is satisfactory to all concerned.

The example of Alliance is cited because of the location of the town on the Mahoning river, and not because it affords the only example of sewage purification to be found in Ohio. There are others in some of which the chemical precipitation features to be seen at Alliance are duplicated, while still other effluents are deprived of their organic and putrescible contents by filtration through land. Sanitary sewage disposal is the rule over a large part of New England; it is fast becoming the rule in New York and other States. It is seen at its best in the older countries, where, by the help of these precautions, the death rate from zymotic, water-borne diseases has been shrunken to the lowest point known to vital statistics.

No single gift of nature so interestingly varies the scenic monotony of the Southwestern Reserve counties as the Mahoning river. It is a pleasant feature. It is a beautiful stream. It has been the pride of its possessors. It furnishes drinking water to all its cities and a thousand conveniences to its possessors. Shall such a water-course be debased into a sewer?

Commenting on a parallel situation, Ruskin said: "Nor is any blasphemy or impiety, any frantic saying or godless thought, more appalling to me, using the best power of judgment I have to discern its sense and scope, than the insolent defiling of those springs by the human herds who drink them. * * * The human wretches of the place cast their street and house foulness, heaps of slime and broken shreds of old metal, and rags of putrid clothes, which, having neither energy to cast away nor decency enough to dig into the ground, they thus shed into the stream, to diffuse what venom of it will float and melt far away, in all places where God meant those waters to bring joy and health." Since this was written the Rivers Pollution Commission has brought about great reforms in England in this particular; reforms, in fact, of such character as should be taken under serious advisement by Youngstown without delay.

The recorded opinion of the American Public Health Association, also of eminent European sanitarians is clearly expressed to the effect that "river waters into which sewage had entered could not thereafter be regarded as a safe source of water supply."

Virchow, the great, far-seeing and profound, maintained that "Sewage must be kept out of water courses whether large or small." Emmerich, of Munich, was a champion of the "self-purification" hypothesis. He cited, among others, the river Elbe which is soiled with sewage of several cities and claimed that "Never a man in Hamburg had been sickened by it." The death of 6,000 Hamburg citizens within four weeks in the summer of 1892 from drinking this same Elbe water gave startling emphasis to Virchow's wise admonition that "An example sometimes answered itself if you only waited long enough."

A word to self-purificationists. Your tenet is a delusion and a snare. Like many another unwarranted hypothesis, it has enough truth about it to satisfy the demands of those who believe it because they want to believe it. The objections to sewage water do indeed shrink somewhat with lapse of time. A long distance between cities during part of the year is safer than a short distance. Pathogenic, water-borne organisms are shorter lived in sunlight than in the dark. Nitrifying agencies act more effectively when the exposed water surfaces afford a plentiful supply of oxygen.

On the other hand, if sewage is immersed in water at a low temperature, and the stream current is imprisoned from sun and air by ice, there is no reason why organic substances might not pass from one end of the Mahoning to the other without change of character. If water purified itself of the seeds of disease, the 6,000 dead at Hamburg and the several hundred dead at Plymouth, Pa., would still be living. These cases are cited because they are freshest in mind, and by no means because they stand alone.

The sense of justice implanted in the human heart always revolts against such a desecration of our fresh water streams. Laws are the exponents of this sense of justice, and allusion has already been made to our own statutes. In every State in the Union there is to be found some statute law beginning substantially with "It shall be unlawful for any person or corporation to cast into any spring, brook, river or pond, filth, refuse, dead animals, sewage, etc., etc."

Court and judicial interpretations of law are not less pointed. We make room for a few illustrations:

Lewis, on "Eminent Domain," pages 65 and 86, has the following: "The general right to the flow of a stream in its natural purity is fully established by the decisions. A company supplying a city with water cannot take the water from a stream and return an equal amount of inferior quality to the damage of the lower proprietors."

Again: "There is no principle which allows a city to conduct into a stream, by means of sewers, the water and filth which comes from a dense population."

Again: "There is no riparian right, even to cities on its banks, to cast filth into a stream."

Again: "One proprietor upon a small stream would not be permitted to place his privy over a stream, or turn into it the refuse from his kitchen and stable; no more can a hundred proprietors of a large stream, or the corporate authorities of a city through which it runs."

Angell, on "Water Courses," paragraph 545, says: a municipality has no more right at common law to pollute streams with sewage than a private person, and its duty to prevent public nuisance, by taking care of the sewage gives it no right to create another nuisance by the pollution of a stream."

Addison on "Torts," paragraph 1049, edition 1876, says: "Boards have no power to collect sewage and pour it into a stream which was previously pure, so as to create a nuisance, or deteriorate the value of the land adjoining the stream. Cities are not entitled to foul rivers with the contents of water closets and convert a stream into a stinking sewer."

Abuses of Ohio streams, such as that at Youngstown, have crept in almost imperceptibly. They are the result of efforts to improve sanitary conditions of certain populations without a due regard to the well-being of others. Such disposal was once thought to be unavoidable, but is so no longer. Unprejudiced persons may easily convince themselves that such abuses can be corrected, and that the cost of doing so is by no means prohibitory. On the other hand the advantage of being in harmony with sanitary requirements furnishes a rational and permanent solution of a disturbing and, at times, an irritating problem.

This report, it will be remarked, has dealt thus far principally with the disposal of sewage, a matter, it is true, which has not been the cause of the most serious complaint in respect to the sewerage system of Youngstown on the part of her citizens.

The annoyances arising from faults in construction, such as overflows, stoppages, and inability to drain wet cellars, have given rise to a feeling on the part of many citizens that the whole sewerage system is a failure and should be condemned and replaced by properly constructed sewers. This would mean a loss of several hundred thousand dollars, and is not, in the opinion of the committee, required. It is believed to be entirely feasible, and without sacrificing sewers now in use, to make such changes and additions as will secure a fairly satisfactory sewerage system. But the turning of sewage into the Mahoning river and its tributaries within city limits is a menace to the best sanitary interests of the people of Youngstown, and an injury to all below who have access to this stream, and the practice, and possible consequences, of river pollution have been pointed out, in the vein of friendly suggestions, and with the hope that expert sanitary advice will be obtained, and that a remedy for the evils referred to will arise as the free and voluntary act of the city of Youngstown.

The problem of bringing all the sewage of the city to one point and there treating it in a manner to remove its objectionable impurities, is one easily within the reach of engineering skill.

Although not requested to report upon the water supply of Youngstown, the committee cannot refrain from expressing its opinion that the increasing sewage pollution of the Mahoning river above the point at which the city's water supply is taken, is a matter of the gravest concern, and it would respectfully suggest that if expert sanitary advice is obtained for improving the sewerage system, the problem of securing a safe water supply be given, at the same time, serious consideration.

Respectfully submitted,
JOSIAH HARTZELL,
C. O. PROBST.
Committee.

REPORT ON ADDITIONAL SEWERAGE FOR ZANESVILLE.

To the State Board of Health:

GENTLEMEN: The city of Zanesville having made application in due form for the Board's approval of an addition to its sewerage system, the undersigned committee inspected the plans and outlet of the proposed sewer on October 6, 1897.

The map enclosed herewith shows the location of the sewer and its outlet into the Muskingum river. The special need for this sewer is for storm water purposes, that part of the city being badly in need of drainage. It is proposed to allow house connections to be made, and the main sewer is to be 24 inches in size, about 1,600 feet in length, and will receive a drainage from an area of nine squares. The sewer is near the corporate limits, and there are but few houses at the present time which will connect with it.

The sewers of Zanesville all discharge into the Muskingum river above where the proposed sewer is to discharge. The river was very low at the time of our inspection, but the volume was still so large that no nuisance was being created by the city's sewage.

There are no cities taking water supply from the Muskingum below Zanesville. Marietta, at the mouth of the Muskingum, now obtains its water supply from the Ohio river.

We recommend that the plans and outlet of the proposed sewer be approved.

Respectfully,

J. C. CROSSLAND,
C. O. PROBST,
Committee.

OHIO STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
COLUMBUS, October 16, 1897.

MR. A. WALLER, City Engineer, Zanesville, Ohio.

DEAR SIR: The State Board of Health has considered your application for approval of an addition to the sewerage system of the city of Zanesville, to consist of a main sewer in the 9th ward, 1,600 feet, more or less, long, and discharging into the Muskingum river.

You are hereby notified that your plans for said addition to the sewerage system have been approved.

Yours truly,

(Signed) C. O. PROBST,
Secretary.

By order of the Board.

Miscellaneous Reports.

REPORT UPON A NUISANCE AT LEESBURG.

To the State Board of Health:

Gentlemen: On December 22d I went to Leesburg, Ohio, by appointment of the President, to advise with the local board of health in regard to some trouble growing out of an effort to abate a nuisance caused by the killing of chickens by Holaday & James. I found that great numbers of chickens are killed by them on their premises, the blood and much of the offal being permitted to lie upon the ground until the place has become very offensive. The first action taken by the local board was a resolution adopted in August, 1896, directing the offenders to discontinue the business, or carry it on in such a way as not to create a nuisance. No attention was paid to this notice, and the board was at a loss how to proceed to secure compliance with its requirements. As the business, as carried on, is in direct violation of section 6923 of the Revised Statutes, I advised that proceedings be begun at once for violation of that law; and I believe the board will act in accordance with the advice given.

While in Leesburg I visited the public school building and made an inspection of the house, the rooms, the well and the vaults, and here I found a deplorable condition of affairs. During the last summer an addition to the building was completed which adds one large room to each story. No provision has been made for ventilation except by the windows, a dangerous way of ventilating the rooms in cold weather. But one flue, and that barely large enough for one stove, was constructed to do duty for two stoves, one in each story, and as a result the draft was so poor that smoke pours out into the school room whenever the stove door is opened. From some defect in or near the roof the walls of one room, intended no doubt for a cloak room, were damp from ceiling to floor. No cellar was dug under the new portion of the building, so that the rooms must be more or less damp from this defect in construction. Such glaring defects in a new building it has seldom been my to lot see, but these sanitary sins did not equal the utter disregard manifested in the arrangement of vaults and well. The vaults, two in number, are six feet deep, ten or twelve feet long and about five feet wide and loosely walled up with bricks. They are dug in the highest part of the school yard, the nearest one being but about seventy-five feet from a well dug to a depth of thirty-five feet in lower ground and undoubtedly in the direction from the vaults of the natural underground current of water. Both vaults are, and for months have been, full of water and excrement to within a few inches of the surface of the ground. The relative situation of the vaults and well is such that it cannot but be that the water in the well is contaminated by the vaults. That this is so is confirmed by the strong sulphurous odor of the water and its bad taste, an odor and taste not possessed by the water until after the construction of the vaults.

Another source of contamination of the well is from the surface. So loose is the soil about the curb and so badly constructed is the drain for the waste water that nearly all of the water pumped from the well, and much of what falls upon the surface, finds its way into the well, as was demonstrated at the time of my visit, the water running directly into the well almost as fast as it was pumped out.

In my opinion this well ought to be condemned and the school board required to fill it up, as the soil contamination must be such that it can not be again made fit for use; and I would respectfully ask the Board to urge upon the local board of health the importance of immediate attention to this abomination. I would also suggest that the school board be requested to give early attention to the matter of ventilation of the school rooms, the construction of an additional flue for the new room, and the removal of the defects in the roof that cause so much dampness in the walls.

Respectfully submitted,

B. STANTON.
Committee.

REPORT ON THE DRAINAGE OF A CEMETERY AT WEST MILTON, WOOD COUNTY.

To the State Board of Health:

GENTLEMEN: The trustees of Milton township, Wood county, have made application for approval of the outlet of a drainage system proposed for a township cemetery near the village of West Milton. I inspected the cemetery August 3, 1897, and respectfully report as follows:

The cemetery is located about one mile from West Milton. It is about five acres in extent. The soil is two and one-half to three feet of sand on hard pan. The surface is flat. Part of the cemetery has been in use for forty years or more. It is underdrained, the water being carried to a railroad ditch, thence to Beaver creek, and thence to the Maumee river. The new part of the cemetery, recently added, is the lowest part and is undrained. It is the drainage of this part that the Board is asked to approve. In wet weather, for a burial in this part, it is necessary to continuously bail the grave during the ceremonies of interment, and the people are clamorous for drainage. The drainage will follow the same course as that from the old cemetery. It is about sixty rods to the railroad ditch, eighty rods of county ditch from its outfall into Beaver creek to its juncture with the Maumee river, and twenty-eight to thirty miles by the Maumee river to the city of Toledo. No complaint has ever been made of the drainage from the old part of the cemetery.

As drainage of the new part is highly necessary and will, in my judgment, injuriously affect no one, I recommend that the request for approval be granted.

Respectfully,

C. O. Probst,
Secretary.

Ohio State Board of Health,
Office of the Secretary,
Columbus, August 6, 1897.

To the Trustees of Milton Township:

Mr. W. M. Leaming, Clerk, Milton Center, Wood county, Ohio.

Dear Sirs: The State Board of Health has considered your application to approve a system of drainage for the township cemetery with an outlet into, first a railroad ditch, thence to Beaver creek, and finally into the Maumee river; and you are hereby notified that your plans have been approved by the Board.

Respectfully,

(Signed) C. O. Probst,
Secretary.

By order of the Board.

A REPORT ON THE USE OF ANTITOXIN IN THE TREATMENT OF DIPHTHERIA IN OHIO.

By C. O. Probst, M. D., Secretary.

Mr. President: In presenting this report the object has been to show the results, as far as can be shown by the statistical method, of the use of antitoxin in the treatment of diphtheria in our own state, and at the same time show how it is being used as regards size and number of injections, day of use, kind of antitoxin, age of patients, etc. All of the antitoxin statistics with which the writer is familiar give only the cases treated with antitoxin, and in contrasting the results with other methods of treatment, cases are taken which occurred at a different period of time, or in an entirely different locality.

Authorities agree, and it is the experience of all physicians of long practice, that diphtheria varies very much in fatality in different years and in different places, and it is thought to be of much greater value, in comparing cases treated with antitoxin with those treated without, to select cases of the same time and place. This report, therefore, deals with cases of diphtheria, treated without and with antitoxin, occurring in Ohio during the year ending February 28, 1897. This was a specially favorable time for such an inquiry to be made, as our state suffered severely from diphtheria during a part of that year, and there seemed to be a larger per cent. than usual of cases of the laryngeal variety.

It may be stated now that the writer took up this inquiry without prejudice, being in doubt as regards the results claimed by the pronounced advocates of the antitoxin treatment; but a careful study of the "brute force of figures," as Virchow called it, here presented, has convinced him that antitoxin, properly used, is undoubtedly an agent of much value in the treatment of diphtheria.

Reports of cases were secured as follows: Blanks were sent to the health officers of the various cities and villages of Ohio, requesting the names of physicians who had reported diphtheria or membranous croup during the year. A sufficient number of blanks were furnished to physicians, whose names were so obtained, to report their cases. Following is a copy of the blank used:

REPORT TO THE STATE BOARD OF HEALTH ON CASES OF DIPHTHERIA AND MEMBRANOUS CROUP TREATED WITHOUT AND WITH ANTITOXIN DURING THE YEAR ENDING FEBRUARY 28, 1897.

1. Name of Patient (initials sufficient)?
2. Age of Patient—Years? Months?
3. Diagnosis
   - (1) Diphtheria?
   - (2) Membranous Croup?
4. Diagnosis—confirmed by
   - (1) Presence of other cases in the family?
   - (2) Bacteriological cultures?
5. How many days and parts of a day after the first appearance of the disease was Antitoxin first administered?
6. How many doses of Antitoxin administered?
7. Dose of each injection in Antitoxin units?
8. Whose Antitoxin used?
9. Non-operative cases—evidence of laryngeal invasion?
   - Appearance of membrane elsewhere?
   - Hoarseness?
   - Aphonia?
   - Stenosis?
10. Operative cases
    - (1) Intubation? On what day?
    - (2) Tracheotomy? On what day?
11. How long, in days and fraction of a day, was tube in the larnyx or trachea?
12. Sequelae (in recoveries)
    - (1) Broncho-pneumonia?
    - (2) Paralysis?
    - (3) Nephritis?
13. Death, cause of; and on what day?
    - (1) Broncho pneumonia?
    - (2) Extension of membrane to the bronchi?
    - (3) Sudden heart paralysis?
    - (4) Nephritis?
    - (5) Sepsis?
    - (6) Accidents of operation?

14. Recovery?
15. Duration of disease in days?
16. Remarks, especially on fatal cases? (Write on opposite page.)

Signed, Name...

Address...

NOTE.—In questions Nos. 3, 4, 9, 10, 12, 13, answers may be made by *erasing the printed answers not applicable to this case.* Returns close April 1, 1897.

This form was used in order that comparisons could be made with the reports of cases collected by the American Pediatric Society for the year ending April 1, 1897, the forms used being almost identical. Over 6,000 of these blanks were sent out, but a much smaller number was returned, and many of these so imperfectly made out as to render them useless for most purposes. This will account for seeming inaccuracies in the totals given in some of the tables.

GENERAL STATEMENT.

Total number of cases reported	2,527	
Total number of deaths	386	
Mortality, per cent		15.2
Total number cases treated without antitoxin	1,475	
Total number deaths in cases treated without antitoxin	250	
Mortality, per cent		16.9
Total number cases treated with antitoxin	1,052	
Total number deaths in cases treated with antitoxin	136	
Mortality, per cent		11.9

TABLE NO. 1—Showing Number of Cases and Deaths by Age Periods.

Ages in years.	Under 1 yr.	1 to 2	2 to 3	3 to 4	4 to 5	5 to 10	10 to 20	20+	Totals.
Cases	33	88	155	167	202	786	456	164	2,051
Deaths	11	22	40	50	42	131	41	7	344
Mortality, perct	33.3	25.0	25.8	29.9	20.8	16.6	8.9	4.2	15.9

This table throws out of account 476 cases and 40 deaths, which were not reported with sufficient accuracy to be used except for the general statement. This slightly increases the mortality percentage in both classes of cases, but does not materially alter their relative proportions. The greatest number of cases, 786, occurred between the ages of 5 and 10. The mortality for this period was 16.6 per cent. The greatest mortality was under one year of age, one-third of the cases dying.

There were 645 cases reported under 5 years of age, with 165 deaths, equal to a death rate of 25.6 per cent.

There were 1,406 cases over 5 years of age, with 179 deaths, equal to a mortality of 12.7 per cent. Forty-five per cent. of all the deaths were of children under 5 years.

Of the 2,051 cases, 7.2 per cent. of those that died were under 5 years, and 8.1 per cent. over 5 years.

TABLE NO. 2—Showing Number of Cases and Deaths Treated Without and With Antitoxin by Age Periods.

WITHOUT ANTITOXIN.

Ages in years.	Under 1 yr.	1 to 2	2 to 3	3 to 4	4 to 5	5 to 10	10 to 20	20—	Totals.
Cases	22	33	74	73	107	441	291	112	1,153
Deaths	6	11	18	28	31	87	29	7	217
Mortality, perct	27.7	33.3	24.3	38.3	28.9	19.7	9.9	6.2	18.9

WITH ANTITOXIN.

Cases	11	55	81	94	95	345	165	52	898
Deaths	5	11	22	22	11	44	12	....	127
Mortality, perct	45.4	20.0	27.3	23.4	11.5	12.5	7.3	....	14.1

Eleven hundred and fifty-three cases, 54 per cent. of the whole number, were treated without antitoxin. Of this number 217, or 18.9 per cent. died.

Eight hundred and ninety-eight, 44 per cent. of the whole number were treated with antitoxin, and 127, or 14.1 per cent. of the cases died.

This includes all the antitoxin deaths whether the injections were made early or late in the disease. Nineteen of these deaths occurred in patients who were moribund, or in a profoundly septic condition at the time of the first injection, or patients who died late in the disease a few hours after antitoxin was administered. Further reference will be made to these cases.

Rejecting these deaths, as may be fairly done, and we have 879 cases treated with antitoxin, and 108 deaths, or 12.3 per cent.

Of 309 cases under five years treated without antitoxin, 94 died, or 30.4 per cent.

Of 336 cases under five years treated with antitoxin, 71 died, or 21.1 per cent.

Of 844 cases over five years treated without antitoxin, 123 died, or 14.6 per cent., while of 562 cases over five years treated with antitoxin, 56 died, or 9.1 per cent. All of the antitoxin deaths are included in these figures.

There is also a distinct gain for cases in adults, and in children over 10, cases in which it has been claimed antitoxin has little effect.

There were 403 cases of over 10 years treated without antitoxin with 36 deaths, or 8.9 per cent., and 217 cases of the same age period treated with antitoxin with only 12 deaths, or 5.5 per cent.

There were 112 cases over 20 years treated without antitoxin with 7 deaths, or 6.2 per cent., while in 52 cases over 20 years treated with antitoxin, none died.

TABLE No. 3—Showing Cause of Death in Cases Treated Without and With Antitoxin by Age Periods.

WITHOUT ANTITOXIN.

Ages in years.	Under 1 year.	1 to 2	2 to 3	3 to 4	4 to 5	5 to 10	10 to 20	20+	Totals.	Per cent.
Broncho-pneumonia	......	......	......	2	2	1	1	......	6	2.8
Extension of membrane to bronchi	1	5	8	18	14	28	4	......	78	35.9
Heart paralysis	2	1	3	4	9	30	9	......	58	26.7
Nephritis	1	......	1	1	......	3	2	......	8	3.7
Sepsis	......	2	3	1	5	16	8	3	38	17.5
Accidents of operation	......	......	......	......	......	1	1	......	2	0.9
Not stated	2	3	3	2	1	8	4	4	27	12.4
Totals	6	11	18	28	31	87	29	7	217	....

WITH ANTITOXIN.

Ages in years.	Under 1 year.	1 to 2	2 to 3	3 to 4	4 to 5	5 to 10	10 to 20	20+	Totals.	Per cent.
Broncho-pneumonia	......	1	......	1	......	2	......	......	4	3.1
Extension of membrane to bronchi	1	2	9	9	5	13	1	......	40	31.5
Heart paralysis	1	4	4	6	2	12	3	......	32	25.2
Nephritis	......	......	1	1	......	2	1	......	5	3.9
Sepsis	1	3	4	4	2	11	5	......	30	23.6
Accidents of operation	......	1	......	......	......	1	......	......	2	1.6
Not stated	2	......	4	1	2	3	2	......	14	11.0
Totals	5	11	22	22	11	44	12	......	127	....

The information given by this table, is not wholly reliable as in many of the reports more than one cause of death was given, and it was sometimes impossible to certainly determine the exact cause of death. Where death was reported as due to sudden heart paralysis and some other cause, the heart paralysis was accepted as the cause of death. In cases where death was reported from broncho-pneumonia and extension of the membrane to the bronchi, the latter was selected as the cause of death.

Accepting the table as approximately correct, it would indicate that there was no tendency for the antitoxin to increase the perils from heart paralysis or nephritis which has been claimed by some to be one of the dangers in using this remedy.

Twenty-six and seven-tenths per cent. of the deaths without antitoxin occurred from heart paralysis, and 3.7 per cent. from nephritis, while there were 25.2 per cent. from heart paralysis in the antitoxin cases, and 3.9 per cent. from nephritis.

The odds show slightly in favor of antitoxin as regards the tendency to produce death by extension of the membrane to the bronchi. If the deaths are excluded where the antitoxin was not administered until very late in the disease, or until the patient was practically moribund, the antitoxin would show much greater gains in this direction.

The deaths from sepsis were greater for the antitoxin cases than for those without, but this difference disappears if we leave out of account those cases where antitoxin was given after septic poisoning had already appeared, at which time it is probable that antitoxin has but little effect.

TABLE NO. 4—Showing Duration of Diseases and Cause of Death in Fatal Cases Treated Without and With Antitoxin.

Time in days.	Without antitoxin.					With antitoxin.				
	Under 7.	Under 14.	Under 21.	Under and over 28.	Not stated.	Under. 7.	Under 14.	Under 21.	Under 28.	Not stated.
Broncho-pneumonia	3	2	1	....	......	3	......	1	......	......
Extension of membrane to bronchi	60	14	4	....	......	35	2	2	......	1
Sudden heart paralysis.........	35	17	2	4	......	25	5	1	......	1
Nephritis	3	2	3	....	......	3	1	1	......	......
Sepsis	22	9	5	1	1	13	11	3	......	3
Accidents of operation.........	......	......	......	... .	2	......	......	......	......	2
Not stated....................................	12	2	2	....	11	10	2	1	......	1
Totals..........................	135	46	17	5	14	89	21	9	......	8
Per cent......................................	62.2	21.2	7.8	2.3	6.5	70.1	16.5	7.1	......	12.6

This table does not show much difference in the duration of the fatal cases whether treated without or with antitoxin.

In the cases treated without antitoxin 62.2 per cent. of the deaths occurred during the first seven days, while 70.1 per cent. of the deaths in the antitoxin cases fell in the same period.

TABLE NO. 5—Showing Cases and Deaths by Day on Which Antitoxin was Injected.

Days.	1	2	3	4	5	6	7	8	9	10
Cases................	295	255	168	82	71	23	16	14	6	6
Deaths..............	18	28	25	15	18	8	6	5	1	2
Per ct. of deaths	6.1	10.9	14.3	18.3	25.3	34.8	43.7	35.7	....	....

This table shows the importance of the early administration of antitoxin.

In 295 cases injected on the first day of the disease there were 18 deaths, 6.1 per cent.

In 550 cases where antitoxin was used the first or second day there were 46 deaths, or a death rate of 8.3 per cent.

But 218 cases injected from the fourth to the tenth day of sickness resulted in 55 deaths, or 24.1 per cent.

Table No. 6—Showing Number of Cases Treated Without and With Antitoxin, in Which Intubation was Performed, with Deaths and Age Periods.

WITHOUT ANTITOXIN.

Ages in years	1 to 2	2 to 3	3 to 4	4 to 5	5 to 10	10 to 20	Not Stated.	Totals.	Mortality per cent.
Cases	2	2	4	4	9	2	....	23	....
Deaths	1	....	3	3	7	2	....	16	65.2

WITH ANTITOXIN.

Ages in years	1 to 2	2 to 3	3 to 4	4 to 5	5 to 10	10 to 20	Not Stated.	Totals.	Mortality per cent.
Cases	4	10	7	14	28	4	5	72	....
Deaths	1	3	4	3	11	1	1	24	33.3

There were 95 cases altogether in which intubation was performed. Forty, or 42.1 per cent. of these died.

Antitoxin shows a decided advantage in these intubation cases. There were 23 intubations without antitoxin. 16 of them fatâl, or 65.2 per cent; while of 72 intubation cases that received antitoxin, only 24, or 33 per cent. of them died. Thirty-five of the antitoxin cases (in five the age was not reported) were under five years, and 32 were beyond.

Table No. 7—Showing Day on Which Intubation was Performed for Cases Treated Without and With Antitoxin.*

WITHOUT ANTITOXIN.

Days.	1	2	3	4	5	6	7	8	Not stated.	Totals.
Cases	....	2	3	3	2	3	2	3	....	23
Deaths	....	1	3	2	1	3	1	2	....	16

WITH ANTITOXIN.

Days.	1	2	3	4	5	6	7	8	Not stated.	Totals.
Cases	9	20	16	12	7	1	....	2	3	67
Deaths.....	4	7	6	3	2	....	....	....	....	23

---

*Of the intubation cases without antitoxin there was also one case each on the 9th, 11th and 16th day respectively, all fatal, and one on the 10th and one on the 12th day that recovered. In the intubation cases with antitoxin there was one case on the 10th day and one on the 14th day that recovered, and one on the 13th and another on the 16th that died.

The number of cases is perhaps too small for just comparison, but the table indicates that in cases receiving antitoxin where it became necessary to intubate after the third day, the chances for recovery were much greater than in those treated without antitoxin.

Of 18 cases treated without antitoxin, intubation being performed after the third day, 12, or 66.6 per cent. died.

Twenty-seven cases treated with antitoxin and intubated after third day, resulted in 7 deaths, or 29.6 per cent.

TABLE NO. 8—Showing Number Days Tube was Retained in Larynx in Cases Treated Without and With Antitoxin, by Age Periods.

WITHOUT ANTITOXIN.

Days.	Under 1 year.	1–2	2–3	3–4	4–5	5–6	6–7	7–8	8–9	Totals.
Cases..........	4	3	4	1	4	1	4	....	....	21
Deaths........	4	3	4	1	....	1	1	....	....	14
Total........	8	6	8	2	4	2	5	....	....	35

WITH ANTITOXIN.

Cases.........	6	10	13	4	14	3	1	6	3	60
Deaths........	5	3	7	1	2	....	....	....	....	18
Total........	11	13	20	5	16	3	1	6	3	78

There were four tracheotomies in which antitoxin was not used. Three of these resulted fatally, one from the operation. The case that recovered, a child two years old, wore a tube ninety-one days.

There were also four tracheotomies in which antitoxin was used, with three recoveries; one a child under two years, and two children between five and ten years.

TABLE NO. 9—Showing Number of Cases with Recovery, Without and With Antitoxin, in Which Paralysis, Nephritis or Both Developed as Sequelæ.

WITHOUT ANTITOXIN.

Ages in years.	Under 1 year	1 to 2	2 to 3	3 to 4	4 to 5	5 to 10	10 to 20	20+	Total.
Paralysis	1	....	3	2	2	19	26	17	70
Nephritis	....	....	6	4	4	23	11	5	53
Both	....	....	....	1	....	6	10	....	17
Total...	1	....	9	7	6	48	47	22	140

WITH ANTITOXIN.

Paralysis	....	1	3	5	4	17	9	7	46
Nephritis..........	....	....	5	1	5	17	5	1	34
Both	....	2	2	....	....	6	1	2	13
Total.............	....	3	10	6	9	40	15	10	93

Paralysis or nephritis developed in 233 cases, or 14.5 per cent. of the entire number of cases which recovered, 1,607.

Paralysis, with or without nephritis, appeared in 146 of these cases, or 9.8 per cent.

There were 65 cases of paralysis or nephritis which developed in children under five years, or 13.5 per cent. of all cases under that age that recovered; and 172 cases in children over ten, or 14.1 per cent. of those over ten that recovered.

There is not a great difference between cases treated with or without antitoxin as regards the percentage that developed sequelæ.

In the 936 cases that recovered, treated without antitoxin, 140 showed paralysis or nephritis, which is 14.9 per cent.; while in 671 antitoxin cases that recovered, 93, or 13.7 per cent. developed these sequelæ.

Taking the cases that showed paralysis (leaving nephritis out of account) and a difference in favor of antitoxin is found.

Nine and three-tenth per cent. of the cases treated without antitoxin developed paralysis and only 5.5 per cent. for the antitoxin cases.

TABLE NO. 10—Showing Number of Injections of Antitoxin, by Age Periods.

Age in years.	Under 1 year.	1 to 2	2 to 3	3 to 4	4 to 5	5 to 10	10 to 20	20+	Totals.
One injection	7	33	53	66	62	229	127	28	605
Two injections	3	19	24	21	32	97	35	7	238
Three injections	1	1	4	3	3	26	5	1	44
Four or more injections	....	2	6	4	3	6	1	2	24
Totals	11	55	87	94	100	358	168	38	911

Six hundred and five, or 64.2 per cent., received only one injection, 238 received two injections; 44, three injections, and 24, four or more injections. In one case which recovered, eight injections, aggregating 4,000 antitoxin units, were given.

TABLE NO. 11—Showing Number of Antitoxin Units Given at First Injections, by Age Periods.

No. of units.	Under 1 year.	1 to 2	2 to 3	3 to 4	4 to 5	5 to 10	10 to 20	20+	Totals.
Less than 500	1	3	3	4	4	4	....	2	21
500	7	18	17	20	15	48	28	7	160
1,000	3	24	50	51	63	240	119	32	582
1,500	....	4	3	5	7	42	13	7	81
2,000	....	5	8	12	6	11	5	4	51
Totals	11	54	81	92	95	345	165	52	895

Five hundred and eighty-two, or 65 per cent. of the cases received, 1,000 units of antitoxin at the first injection. Seven of the cases under one year received 500 units. Only 51 cases received 2,000 units for the initial dose.

The following shows the kinds of antitoxin used, and the cases and deaths for each kind:

Kind of antitoxin.	No cases.	No. deaths.	Per cent.
H. K. Mulford	521	70	13.4
Parke, Davis & Co	212	30	14.1
Behring	116	17	14.6
All others	58	10	17.3

In criticising the report up to this point the question will doubtless be asked—How many of these cases were true diphtheria, and how many were cases of simple angina that usually recover without treatment of any kind.

In answer to that, one might well say—There is no reason to believe that the proportion of cases of non-diphtheritic sore throat is greater among the cases here reported that received antitoxin than among those that did not; and taking the cases as they come, in every way in which they can be compared, a marked gain in favor of those treated with antitoxin is found.

As a crucial test, all cases that did not show evidence of marked involvement of the larynx or air passages have been eliminated, and a comparison made between those that received antitoxin and those that did not. This includes all cases reported as membranous or diphtheritic croup, cases in which intubation or tracheotomy was performed, and all cases reported as diphtheria in which hoarseness and stenosis were present. In the latter cases there was also, in most of them, aphonia. The total number of these cases was 618, which is 29 per cent. of the entire number of cases reported.

TABLE NO. 12—Showing Cases and Deaths with Invasion of the Air Passages Treated Without and With Antitoxin, by Age Periods.

WITHOUT ANTITOXIN.

Ages in years.	Under 1 year.	1 to 2	2 to 3	3 to 4	4 to 5	5 to 10	10 to 20	20+	Total.
Cases	6	16	32	41	44	107	26	5	277
Deaths	3	9	21	26	30	51	12	1	153
Per ct. of deaths	50.0	56.2	65.6	63.4	68.2	47.7	46.1	20.0	55.2

TABLE NO. 12—Showing Cases and Deaths with Invasion of the Air Passages Treated Without and With Antitoxin, by Age Periods.

WITH ANTITOXIN.

Cases	7	25	49	41	39	140	32	8	341
Deaths	4	8	18	13	9	35	6	....	93
Per ct. of deaths	57.1	32.0	36.8	31.6	23.1	25.0	18.9	....	27.3

There were 618 cases and 246 deaths, equal to 39.8 per cent. Three hundred of the cases, or 48.5 per cent., were under five years. Fifty per cent. of those without antitoxin were under five, and 44 per cent. of the antitoxin cases. Fifty-eight and one-tenth per cent. of the deaths in both antitoxin and other cases were patients under five years.

The contrast in the laryngeal cases, between those receiving antitoxin and those that did not, is very marked.

Of the 277 cases treated without antitoxin 153 died, or 55.2 per cent.; while of 341 cases treated with antitoxin but 93, or 27.3 per cent. died.

Reference has been made to nineteen fatal cases treated with antitoxin which could fairly be excluded. These were all laryngeal cases, and may be summed up as follows :

1. Intubation case. Tube coughed out in the night ; physician not called in time, and child suffocated.
2. Injected with antitoxin on 10th day; died same day of sepsis.
3. Tracheotomy case ; injected on 8th day and died same day.
4. Patient injected on 5th day and died four hours later of sepsis.
5. Child much improved ; membrane gone ; mother had it walk from middle of room to bed, and it died a few minutes later from heart paralysis.
6. Patient injected 6th day and died four hours later.
7. Injection on 5th day ; child moribund ; died same day.
8. Injected 5th day ; bad case ; died same day.
9. Injected 6th day ; died six hours later.
10. Injected 5th day ; advanced case ; died eight hours later.
11. Child moribund ; died one hour after injection.
12. Died a few minutes after intubation ; accident of operation.
13. Injection on 10th day ; child moribund.
14. Injection on 16th day ; bad case ; died same day.
15. Severe stenosis at time of injection ; prepared for tracheotomy, but child died few hours after injection.
16. Leaky syringe ; patient only got partial dose.
17. Injection 10th day ; child moribund ; died same day.
18. Died from sepsis eight hours after injection.
19. Injected 5th day and died a few hours later.

If it be permitted to subtract the nineteen deaths from the laryngeal cases that received antitoxin we have 322 cases with 76 deaths, equal to 23.6 per cent.

There were two deaths which were possibly due to antitoxin, though there is no positive proof of this.

One child injected on the first day of the disease died eight hours later. Another child injected on the first day, died two hours after injection.

TABLE NO. 13—Showing Cause of Death by Age Periods in Laryngeal Invasion Without and With Antitoxin.

WITHOUT ANTITOXIN.

Ages in years.	Under 1 year.	1 to 2	2 to 3	3 to 4	4 to 5	5 to 10	10 to 20	20+	Totals.
Broncho-pneumonia	......	......	......	2	2	1	......	......	5
Extension of membrane to bronchi	1	5	10	17	15	20	3	......	71
Sudden heart paralysis	2	1	4	3	6	10	4	......	30
Nephritis	......	......	1	......	......	1	1	......	3
Sepsis	......	......	1	1	4	10	3	1	20
Accident of operation	......	......	......	......	......	1	1	......	2
Not stated	......	3	5	3	3	8	......	......	22
Totals	3	9	21	26	30	51	12	1	153

WITH ANTITOXIN.

Ages in years.	Under 1 year.	1 to 2	2 to 3	3 to 4	4 to 5	5 to 10	10 to 20	20+	Totals.
Broncho-pneumonia	......	1	......	......	......	3	......	......	4
Extension of membrane to bronchi	1	2	9	6	4	11	2	......	35
Sudden heart paralysis	......	3	3	2	2	9	2	......	21
Nephritis	......	......	......	......	......	2	......	......	2
Sepsis	1	1	3	3	2	5	2	......	17
Accident of operation	......	......	......	......	......	1	......	......	1
Not stated	2	1	3	2	1	4	......	......	13
Totals	4	8	18	13	9	35	6	......	93

To briefly summarize: There were 1,475 cases of diphtheria and membranous croup treated without antitoxin, of which number 250, or 16.9 per cent. died.

There were 1,052 cases treated with antitoxin, of which number 136 died, or 11.9 per cent.

There were 277 cases showing extension of the disease to the air passages in which antitoxin was not used, resulting in 153 deaths, or 55.2 per cent., and 341 such cases treated with antitoxin, of which number 93, or 27.3 per cent. died; or, subtracting nineteen deaths where antitoxin was given too late to be of benefit, 76 deaths, or 23.6 per cent.

There were twenty-three cases not treated with antitoxin where intubation was performed. Of this number 16 died, or 65.2 per cent.

Of the 72 cases receiving antitoxin, intubation being performed, 24 died, or 33 per cent.

HOW FAR SHOULD MANDATORY MEASURES GO IN DEALING WITH (1) MEASLES; (2) WHOOPING COUGH; (3) TUBERCULOSIS; (4) LEPROSY.*

By C. O. PROBST, M. D., Secretary.

MR. PRESIDENT: The time allowed for covering so wide a field gives opportunity for only the briefest argument in favor of one's views upon this question; and much must be left to the general discussion which, I trust is to follow.

Although we are still in the dark as to the cause of two of these diseases—measles and whooping cough—none will dispute, I think, the first proposition that all of them are preventable. Given control of conditions, we can take a case of measles, whooping cough, leprosy or tuberculosis, and absolutely prevent spread of the disease.

Do these diseases occupy a sufficiently prominent place in the death rates to warrant putting into operation mandatory measures for their prevention? No one will question this as to tuberculosis, but it is quite different, at least in the popular mind, as regards measles and whooping cough. We are, unfortunately, unable to say for the United States, with the same degree of certainty as for England and Wales, what tribute these diseases exact annually. Still we are not without light upon this question.

According to statistics collected at the 11th. census, there were in the United States during the year ended May 31, 1890, 9,256 deaths from measles, 8,432 from whooping cough, fifteen from leprosy and 102,199 from consumption. This represents for each 100,000 living inhabitants 14.6 for measles, 13.4 for whooping cough, and 163.2 for pulmonary tuberculosis.

This is undoubtedly considerably less than the actual number, as the returns for nearly two-thirds of the population were made by census enumerators, whose reports gave a total number of deaths of but a little over 10 per 1,000 population, whereas when the true death rate was in the neighborhood of 18 per 1,000.

For the same year—1890—in England and Wales, the death rate per 100,000 living population was 43.9 for measles, 47.8 for whooping cough, and 168.2 for phthisis. A fairer comparison may be made by taking the large cities of the United States where accurate records are kept. In the United States in twenty-six cities of over 100,000 inhabitants, with an aggregate population of 9,697,960, the deaths per 100,000 living inhabitants were 17 81 for measles, 17.23 for whooping cough, and 268.81 for consumption. In the twenty-eight largest English cities, the death rate per 100,000 living population was for 1890—according to the United States census reports—sixty-three for measles and fifty-nine for whooping cough.

These figures represent deaths only, and take no account of those left with weakened bodies and impaired organs, which render them an easy prey for other diseases. Taken at their face value they indicate that measles and whooping cough are much less prevalent or much less fatal in the United States than in England. But they certainly show, even for the United States, that measles, and whooping cough are far from being trivial affections; and few realize that they destroy each year more children than scarlet fever, of which the public has a very considerable dread.

---

*Read before the Section of State Medicine of the British Medical Association, held in Montreal, 1897.

It is difficult to lay down mandatory rules for dealing with measles, whooping cough or tuberculosis, because of certain facts. In the first place the two former are highly contagious before diagnostic symptoms are present. Further, a large number of the cases are never seen by a physician, and it becomes impossible to obtain full reports of them. Again, while our laws make it the duty of parents and householders to give notification, we must show that we know the nature of the disease; and that is usually impossible.

In tuberculosis we have a center of infection lasting years instead of days, and a moving center; for we cannot expect to isolate tuberculous patients. In addition, this is a disease transmissible from the lower animals, and the mandatory control of tuberculous animals and their food products is necessary in its prevention. We have also the weight of public opinion against us in attempting to enforce mandatory measures in dealing with these diseases, except possibly, leprosy; and one engaged in practical sanitary work well knows what a load this is to carry.

Approaching the question more nearly, and considering first measles and whooping cough. Shall we require notification? I say, yes. All measures of a mandatory nature must hang on this; for like the old receipt for cooking a hare, we must first catch our cases. It is true that in some of the English towns where notification of measles has been tried and abandoned it has seemed of little value, or at least not the cost. But in the United States physicians are not feed for reporting cases, so that for us the expense objection largely disappears.

It has been contended that without isolation hospitals notification is of no value. If this be true for measles, it should be nearly as true for scarlet fever and perhaps diphtheria. Isolation hospitals, except for smallpox cases, are almost unknown in the United States, and yet we have had a fair measure of success in limiting the spread of scarlet fever by domiciliary quarantine.

Notification of measles and whooping cough, with the isolation and disinfection which should of course follow, is of undoubted value for small villages and rural districts. Here they appear only at intervals; and if the authorities are on the alert and receive prompt notice of the introduction of a case of either disease, it is often possible to confine it to one, or at most, to a few households.

Closing the public schools, and prohibiting other large gatherings of children, are mandatory measures which are of value in contending against these diseases. This is not of so much importance for the school children themselves as for the younger children at home. Two-thirds of the deaths from measles reported in the United States during the last census year, and over nine-tenths of the deaths from whooping cough of children under school age. More than half the deaths from whooping cough were of children under one year. In looking for preventive measures, we should keep in mind these tenderlings who so readily succumb when attacked. By closing the schools during the prevalence of measles or whooping cough, we may hope to protect at least some of these from infection carried to them by children attending school. Perhaps the chief cause for the prevalence of measles and whooping cough is the slight regard in which they are held by the public; and so long as health officials ignore them in schemes for prevention of disease we expect this same public to remain in the belief that they are of little consequence.

For measles and whooping cough then I would advocate notification, placarding, domiciliary restraint of the patient and all susceptible children in the family, with official supervision of disinfection. Where isolation hospitals are accessible, the early removal of the patient is undoubtedly much safer than to leave him at home. Schools should be closed for a time in any district where either disease threatens to become epidemic, and the school buildings disinfected before they are reopened.

Leprosy is alarming from its history rather than from any present prevalence of the disease. For the census year of 1880, sixteen deaths were reported in the United States from leprosy; during the census year of 1890 there were but fifteen. It has not been considered necessary to enforce strict isolation in leprosy, as there has been practically no extension of the disease to the American born. But, admitting its contagiousness, and considering its loathsome character and invariably fatal termination, it appears plain that some provision should be made for the segregation of all lepers. As our lepers in the United States are largely aliens, and are now few in number, I am in favor of having the National Government establish a suitable place where all lepers may be confined.

Little has been done in the United States in a mandatory way for the prevention of tuberculosis. In a very few places notification is required, and disinfection of houses in which tuberculosis patients have lived, has been offered but not compulsory. There is still some opposition from the medical profession to the notification of cases. The great mass of the laiety scarcely regard it as a contagious disease. It is indeed only within comparatively recent years that health authorities have even attempted to mould public opinion to this view. Mandatory measures for controlling tuberculosis must, therefore, necessarily be of the mildest character at first. Notification, as in measles and whooping cough, must precede other measures. Isolation of the patient is impracticable, and unfortunately not nearly so necessary as in most of the other infectious diseases.

Health authorities should assume responsibility for the proper disinfection of houses which have been occupied by tuberculous persons. We know that tubercle bacilli, under conditions liable to be met with in such houses, may live for years. Flick has shown us that in Philadelphia infected houses have played an important role in propagating tuberculosis. Disinfection of such places by public authority, besides rendering them safe for future occupancy, would teach a much needed lesson to the public, viz., that tuberculosis is a contagions disease and must be handled with care. The people well know its terrible ravages, and if they can only be made to fully realize that it is spread by contagion and infection, we shall find much less difficulty in dealing with it.

In hospitals, prisons and like places supported by public funds we should require much more than this to be done. Here we should be able to secure practically complete separation of the tuberculous affected, and to have the most careful attention paid to disinfection of the sputa. The same should be largely true of our Army and Navy. I would advocate for the United States, the building of a hospital by the National Government, located in a favorable place as regards climatic conditions, where all tuberculous patients of the Army and Navy could be sent. With sufficient land for cultivation, and the early recognition of those who should be sent there, such a place could be made practically self sustaining.

While not a mandatory measure, and therefore outside the discussion, I must urge in passing, that the State and Provincial Governments should no longer delay coming to the relief of the health authorities by providing hospitals for such cases of this disease as cannot be properly cared for in their homes.

Any plan for the prevention of tuberculosis must take into consideration tuberculosis of animals, and more especially of milch cows. The danger from tuberculous meat does not appear to be very great, and is certainly nothing like that of tuberculous milk. Here it would seem that health authorities have their best opportunity for commencing the enforcement of mandatory measures against tuberculosis. Boards of health are already at work in this dsrection. The city council of Minneapolis, Minnesota, adopted an ordinance that only milk from cows free from tuberculosis as shown by the tuberculin test, should be sold in that city. The ordinance was contested on the grounds that council had no jurisdiction outside of city limits; and that the tuberculin test was uncertain and unreasonable. The Supreme Court of Minnesota decided both points in favor of the city.

Bang, of Denmark, has shown us that it is not necessary that all tuberculous animals should be slaughtered to eradicate the disease from any particular herd. By simply separating the sound from the unsound, slaughtering animals far advanced in the disease, and feeding calves born of tuberculous cows with milk from healthy cows, or milk that has been boiled, it is possible in three years time to completely eradicate tuberculosis from a herd in which, at the beginning, 80 per cent. of the milk cows are affected. Others have reported successes nearly as good. This is very encouraging, and if borne out by wider experience, will make it much easier to deal with this question of tuberculosis in cattle.

For the present, I would recommend that the local authorities be given powers—and be urged to use them—to provide that all animals furnishing milk to their respective towns or cities shall be shown, by a satisfactory examination, to be free from tuberculosis. The central authorities should be able to prescribe regulations for the housing and keeping of milch animals; and these the local authorities should be required to enforce. The filthy condition and bad ventilation of cow stables is undoubtedly a potent factor in the spread of tuberculosis among cattle.

It will be admitted that it requires something more than the bacillus tuberculosis to produce consumption. The soil must be prepared for its growth; and there are many conditions favorable to this which should, and I believe could be dealt with by mandatory measures. Certain of the occupations, especially those in which workmen must be exposed to certain forms of dust, are a most prolific cause of consumption.

Our factory and workshop inspectors have already done much towards bettering these conditions, but a great deal remains to be done, which could be better done by the sanitary authorities. There is undoubtedly a close connection between the breathing of impure air and the production of phthisis pulmonalis. It has been said that consumption is the penalty the race is paying for changing its habit of living out of doors. Mandatory measures should be applied for the amelioration of this evil. Our building laws already take note of this, but do not go far enough and are not properly enforced. There should be a limit to the number of persons that may be crowded into a tenement house; and sufficient yard area should be one of the conditions of securing a permit to build. We are told that education must precede legislation. This does not mean that we must wait, in enforcing mandatory laws for the protection of life, health or property until all the people are educated. Intelligence rules the world, and it is intelligent opinion that is to be guided. The masses have been scourged for ages with smallpox, cholera, and the plague. Yet we still find it necessary to use mandatory measures in dealing with these diseases. If the entire race could be lifted to the plane of present sanitary knowledge, we should still find, unless human nature should be changed, that people must be made to do their duty.

Summing up my conclusions I would say, that with a full realization of the many difficulties executive officers will have in attempting to employ mandatory measures against the diseases under consideration, and with the certainty that such measures can have, at first, but a limited success, my belief is that those in authority will some day be held responsible for a grave neglect of duty if they do not make a serious effort to carry mandatory measures to the farthest possible limits in the prevention of this quartette of diseases for which, at the present time, so little is being done.

REPORT ON THE MECHANICAL FILTRATION OF THE PUBLIC WATER SUPPLY OF LORAIN.

To the Members of the State Board of Health :

SIRS : Lorain, Ohio, is situated on Lake Erie, at the mouth of Black river. In 1890 it had a population of 4,863, but the recent location of a large steel plant there which employs several thousand men has caused a large growth of the city, which is now estimated to contain over 10,000 inhabitants.

Seven miles from Lorain, on the Black river, is Elyria, a city with a present population of about 7,000. The sewage of Elyria is discharged into Black river. The sewage from Lorain also gets into the river.

The water supply of Lorain, until some time in 1895, was taken from Lake Erie at a point 1,200 feet from shore line, and a few hundred feet west of the mouth of Black river. Since sewage from Lorain has been discharged into Black river, the city has suffered more or less severely from typhoid fever. As wells are little used for drinking water the public water supply was suspected to be at the root of the trouble.

In 1895 the waterworks board of Lorain applied to the State Board of Health for approval of a change in the public water supply of that city ; the change to consist of an extension of the intake pipe 310 feet further into Lake Erie, in a northwesterly direction. After proper investigation, the Board reported as follows :

COLUMBUS, OHIO, April 3, 1895.

Mr. H. J. BARROWS, President Water Works Board, Lorain, O. :

SIR : The State Board of Health has considered your application to approve the proposed change of the source of the public water supply of Lorain. Approval is withheld pending further investigation, as the Board is not satisfied that the proposed lake intake is sufficiently removed from the mouth of Black river to avoid sewage contamination.

Respectfully,

(Signed) C. O. PROBST,
Secretary.

In June, 1896, the water works board of Lorain asked the Board to approve of changing the water supply of Lorain by subjecting it to filtration, using mechanical filters constructed by the O. H. Jewell Filter Company. The Board approved the proposal to make a six months' trial of the filters.

In April, 1897, the water works board of Lorain submitted reports from Dr. A. J. Baumhardt, city bacteriologist, and from Mr. Arthur Brown, chemist, for the Jewell Filter Company. The Board, not deeming these reports conclusive, instructed the Secretary to arrange for an examination of the filters, and report upon their efficiency.

Mr. Allen Hazen, of New York, was engaged as consulting engineer, and Mr. F. S. Hollis, of Boston, as bacteriologist. Mr. B. H. Flynn, of Columbus, was secured as assistant. The examinations were continued from June 8 to July 20, 1897. Following is a copy of the report submitted by Mr. Hazen:

NEW YORK CITY, August 5, 1897.

DR. C. O. PROBST, Secretary State Board of Health, Columbus, O.:

SIR: I beg leave to submit the following report upon the tests of the Jewell filtration plant at Lorain, Ohio, for a period of five weeks, from June 13 to July 17, 1897. These tests were made under my instructions by Mr. F. S. Hollis, of Boston, with the assistance of Mr. B. H. Flynn, of Columbus, Ohio.

DAY USED IN CALCULATION.

For the purpose of calculation, the day was considered as the twenty-four hours ending at six o'clock P. M. of the date given, and all statements of quantity are for this period.

PUMPS.

Three pumps are in use, two pumping lake water to the filters, and one pumping filtered water from the filters to the city. The two pumps pumping to the filters are operated in connection with each other. The first is a Walker fly-wheel pump, erected in 1884, with twelve-inch stroke. The diameter of the cylinders is nominally 7½ inches, but has been increased by wear to 7.56 inches. The other pump supplying the filters is a Gordon pump, erected in 1892. The diameter of the water cylinders is 14 inches, and the nominal stroke is 24 inches. During the earlier part of the tests the actual stroke was 22.25 inches, but this was afterwards increased by a change in the cut-off of the steam to 23.60. The stroke of this pump was measured at frequent intervals, and in calculating the quantities pumped the actual length of stroke was used and not the nominal length.

These two pumps pumped into a system of piping supplying the filters. The quantity of water drawn by each filter is controlled by a butterfly valve operated by a float on the water in the filter. When more water is pumped than is required, these valves are partially closed and the pressure increases until the point is reached where the pumps will only pump the quantity required against the pressure maintained. As both pumps were built for high pressure service, a pressure of water is constantly maintained far in excess of that necessary for throwing the water to the filters, and the cost of pumping is, by this arrangement, made unnecessarily great.

The pump used for forcing the water into the pipe system is a Holly fly-wheel pump, erected in 1896. The water cylinders are 21 inches in diameter, and the stroke is 36 inches. The pump has a nominal capacity of 5,000,000 gallons daily, while the consumption of water during this test was only a little above 2,000,000 gallons daily. The operation of the pump is not steady when pumping so small a quantity, and in order to secure satisfactory operation a relief valve from the force main to the pure water well was ordinarily kept open, so that the pump was operated at a high rate, and a part of the water pumped was returned to the clear water well. The wastefulness of this operation is so obvious as not to require comment. Its effect upon our test was to make it impossible to determine from the record of this pump the amount of water which was being delivered to the city.

RATING OF PUMPS.

At the commencement of the test the Gordon and Walker pumps needed packing badly, and they were packed and put in order during the first days of the test. Owing to these changes, the exact quantity of water pumped during the first four days is not known. An estimate is used in the following calculations based on the observed consumptions for the following days. Directly after the old pumps had been repaired an arrangement was made to shut the waste valve from the Holly pump during those hours of one day in which the consumption was greatest and in which none of the filtered water was used for washing filters. The pump counters were read at the beginning and expiration of this time, and observations were also made upon the height of water in the pure water well, and correction made for differences. It was assumed that the slip, of the Holly pump, which was comparatively new and in good repair, was five per cent., and upon this assumption the percentage of slip of the Gordon and Walker pumps, freshly packed, taken together, was found to be 10.4 per cent. The experiment was repeated on the 5th of July, at which time the calculated slip of the Gordon and Walker pumps was 9.2 per cent. For the purpose of calculating the quantities of water pumped from the lake, the records of the Gordon and Walker pumps are taken, and the slip is estimated at 10 per cent.

The quantity of water wasted to the clear water well from the Holly pump was for a greater part of the test about 400,000 gallons per day, but during three or four days of greatest consumption it was reduced to less than 100,000 gallons per day, and on several days it rose to above 600,000 gallons per day.

FILTERS.

There are six filters furnished by the O. H. Jewell Filter Company of Chicago. The plant has not yet been accepted by the city, and the operation is under control of this company. The filters are 17 feet in diameter and have an effective filtering area of 226 square feet each, or 1,356 square feet in all. The sand employed is four feet deep, and is from Red Wing, Minnesota, and has an effective size of 0.40 millimeter and a uniformity coefficient of 1.7. The grains are smooth and nearly spherical in shape.

A certain quantity of sulphate of alumina in solution is added to the lake water as it is pumped into the filters. The filtration takes place downward through the sand. When the sand becomes clogged it is washed by a reverse current of filtered water, with the aid of a mechanical stirring device. The rate of filtration is regulated by a float controlling the outlet valve, which rises and closes the valve as the water rises in a small receptacle in the bottom of which is an orifice of determined size. This apparatus insures a reasonably constant rate of filtration during the whole period between washes. The filtered water is stored in a pure water reservoir directly under the filters, connected with the suction of the Holly pump, and it is into this well that the above mentioned relief valve from the Holly pump discharges.

FILTERS OUT OF OPERATION.

On June 18th the alum pump was out of use, for repairs to connections, for three hours, and water was filtered without the addition of alum. On June 28th, at 11:30 P. M., the pipe from the Gordon and Walker pumps to the filters burst, and repairs were not completed until 2 P. M. of June 29th. During this interval of fifteen hours unfiltered lake water was pumped to the city. No samples were taken for bacterial examination during or immediately after this condition.

AMOUNT OF WASH WATER REQUIRED.

It was at first thought that the wash water as discharged from the filters could be measured in tubs set for that purpose, but it was soon found that the quantities were too large, and a weir was then placed so that all of the wash water flowed over it. The height of water on this weir was taken at minute intervals during representative washings, and the quantity required for each washing calculated. Forty-one washings were thus observed, and the quantities of water used for the other washings were estimated to be the same as the average of those observed. The average number of filters washed per day was fourteen. The time required for washing was from four to twelve minutes, averaging 8½ minutes. The average amount of water used for washing one filter was 8,200 gallons, or about 1,000 gallons per minute for the time of washing. The greatest ordinary rate of draught during the washing was 1,500 gallons per minute. The quantity of water used for washing was equivalent to a solid column of water five feet deep and of the same area as the effective filtering area of the filter. The reverse rate of washing, 1,500 gallons per minute, is equivalent to 6.7 gallons per minute per square foot of area, or about six times the rate of filtration ordinarily used. The wash water amounted to 5.1 per cent. of all the water pumped from the lake, and to 5.5 per cent. of the output of filtered water available for the use of the city.

SULPHATE OF ALUMINA EMPLOYED.

The sulphate of alumina used as a coagulant was analyzed by Prof. N. W. Lord, of Ohio State University, who found it to contain 44 per cent. of water of crystalization. The sulphuric acid, reckoned as SO_3, was 37.4 per cent. It is what is known as Natrona alum, and of the grade commonly used in mechanical filtration.

This alum was weighed out into large tubs at intervals and dissolved in water which was then pumped through a small meter into the water approaching the filters, the amount applied at any given time being regulated by the speed of the pump. A record was kept of the amount weighed out each day and of the stock on hand at various times, and of the amounts bought, which accounts agree substantially The quantity of alum per gallon was calculated from the amount used each week, reckoned upon the water pumped by the Gordon and Walker pumps, with ten per cent. allowance for slip, less such amounts of water as were used without filtration and as were filtered without the use of alum.

QUANTITY OF ALUM BY CHEMICAL ANALYSIS.

When sulphate of alumina is added to Lake Erie water before filtration, it is decomposed, and the alumina is precipitated and retained by the filter. All of the sulphuric acid passes through with the effluent and the sulphuric acid is increased over that in the lake water by the amount added. It was found possible to determine the amount of sulphuric acid added to the water in this way with great accuracy, and tests were made in this way regularly at least twice each day during the period of the tests, and the quantities of sulphate of alumina corresponding to this increase in sulphuric acid were calculated and compared with those calculated from the weights.

These results show that the amount of sulphate of alumina added varied considerably. In the first three weeks it was found that the quantity of sulphate of alumina added to the water varied from 3.9 to 2.1 grains per gallon, and in the last two weeks the quantities ranged from 1.7 to 0.8 grains per gallon. These very wide fluctuations in periods when the quantities were intended to be constant suggest the desirability of improving the apparatus for controlling the amount of alum.

For the whole period the quantity of sulphate of alumina shown by the increase in sulphuric acid was 10 per cent. greater than that calculated from the weights. This discrepancy may be accounted for by a greater pump slip than that assumed or by the use of more alum during the day than during the night (chemical samples were taken in the day time only), or by errors of analysis, or by other minor unavoidable errors, or by a combination of two or more of these possible sources of error. The agreement is sufficiently close to give confidence in the measurements as a whole.

QUANTITIES FILTERED, ETC.

During the first five weeks of the test 79,360,000 gallons of water were pumped from the lake. Of this quantity 271,000 gallons were filtered without the addition of alum (owing to a break in a steam pipe), 1,400,000 gallons were pumped to the city without passing through the filters, while 77,960,000 gallons passed through the filters. Of this quantity 4,060,000 gallons were used as wash water, leaving 73,629,000 gallons, or an average of 2,104,000 gallons of water per day as the amount of properly filtered water pumped to the city. The quantity of alum used was 20,330 pounds, or 1.83 grains per gallon, reckoned on all the water, including wash water, to which alum was applied. The amount of alum shown by the increase of sulphuric acid in the effluent over the lake water was 2.01 grains per gallon, or 10 per cent. more than the quantity shown by the above rates. The average rate of filtration was 1.14 gallons per square foot of filtering area per minute, no deduction being made for the times when filters were out of use for the purpose of being washed, or for the amount of wash water not available for the purpose of supply.

The quantity of alum employed was about 2½ grains per gallon during the first three weeks of the test. This quantity was being used by the O. H. Jewell Filter Company for the pupose of securing an effluent of the greatest possible purity. As the final payment for the filtration plant depended upon their securing a certain bacterial efficiency for six months, they were unwilling to reduce the quantity of alum before the final acceptance of the plant. It was arranged, however, that the representatives of the city should take no samples for a period of two weeks, and upon that being agreed to by the city, the quantity of alum was, at my request reduced as nearly as possible to a grain per gallon for the last two weeks of the test, at the expiration of which period the quantity was again increased to about the amount previously used.

Following is a tabular statement of the quantities of water pumped, filtered and used for wash water, the amounts not filtered, etc., the quantities of alum used, and the rates of filtration by weeks.

TABLE OF WATER QUANTITIES.

Week ending 6:00 P. M.	Water pumped from lake, gallons.	Consumption of filtered water, gallons.	Water treated with alum, gallons.	Wash water, gallons.	Filtered without alum, gallons.	Used without filtration, gallons.
June 19	14,700.000	13,569,000	14,429,000	860,000	271,000	
" 26	15,030,000	14,160 000	15,030 000	870 000		
July 3	16,610,000	14,360,000	15,210,000	850 000		1,400,000
" 10	17,440,000	16,690,000	17,440.000	750,000		
" 17	15,580,000	14,850.000	15,580,000	730,000		
Total	79,360,000	73,629,000	77,689,000	4,060,000	271,000	1,400.000

TABLE OF ALUM QUANTITIES AND RATES.

Week ending 6:00 P. M.	Alum used, pounds.	Cost of alum.	Alum, grains per gallon of all water treated.	Alum, grains per gallon, calculated from chemical analysis.	Average rate of filtration, gallons per sq. foot per minute.	Average rate of filtration, gallons per acre daily.
June 19	5.320	$94 54	2.58	2.47	1.06	67,000,000
" 26	5.320	94 54	2.48	2.87	1.10	69,000,000
July 3	4,940	87 78	2.27	2.42	1.11	70,000,000
" 10	2,660	47 27	1.07	1.35	1.28	80.000 000
" 17	2,090	37 14	0.94	0.97	1.14	72,000,000
Total	20,330	$361 27	1.83	2.01	1.14	71,500,000

BACTERIAL RESULTS.

In all, 67 samples of lake water as pumped to the filters, and 66 samples of filtered water, were taken for bacterial examination. Two or three sets of samples were taken each day, usually one in the morning and one in the afternoon, and occasionally one in the early evening. No samples were taken during the night. The samples were planted in gelatine by the usual methods, and with a very few exceptions were counted after a five days' growth. A few samples were counted after a four days' growth only.

Mr. Hollis noted that the development of the bacteria in the samples of effluent was somewhat slower than in the lake water, which difference he thought might possibly be due to a retarding influence from the addition of alum. Samples were occasionally taken from the taps in the city, the results from which did not differ materially from those from the outlets from the filters. Samples were also taken on several occasions of the effluents directly after washing, and at intervals during the run. These tests showed substantially the same bacterial efficiency at all periods o the run, and are not here given in detail. The bacterial results secured are shown in the following table, from which the hours of collecting the samples have been omitted for convenience:

TABLE OF BACTERIAL RESULTS.

	Week ending June 20.		Week ending June 27.		Week ending July 3.		Week ending July 10.		Week ending July 17.	
	Lake.	Effluent.	Lake.	Effluent.	Lake.	Effluent.	Lake.	Effluent.	Lake.	Effluent.
Sunday	....	....	....	....	200	5	262	13	205	13
	....	....	....	....	100	4	....	....	179	27
Monday	95	6	800	14	100	3	125	13	166	26
	135	8	1.150	4	300	7	138	15	80	18
	....	....	....	....	....	....	156	21	....	....
Tuesday	85	....	92	3	*	*	108	20	97	18
	67	8	362	10	*	*	293	18	250	30
	....	....	....	....	....	....	144	22	....	....
Wednesday	165	7	400	5	500	8	89	11	149	42
	8.392	27	400	5	400	6	207	16	146	27
	....	....	....	....	....	....	155	15	160	20
Thursday	3 485	18	200	5	103	3	175	15	375	33
	620	4	398	5	300	8	159	14	104	21
	....	....	....	....	....	....	99	8	....	....
Friday	163	10	99	4	400	9	79	10	222	35
	975	7	158	5	800	15	260	15	242	28
Saturday	90	3	274	5	500	10	79	10	268	28
	3,020	80	284	6	700	30	82	11	....	....
Average	1.441	16	385	6	367	9	154	14	189	26

*Filters not in operation.

SUMMARY.

Week ending 6:00 P. M.	Rate of filtration, gallons square foot per minute.	Alum, grains per gallon.	Bacteria in lake water.	Bacteria in effluent.	Bacterial efficiency, per cent.
June 19.	1 06	2.58	1,441	16	98.9
June 26.	1.10	2.50	385	6	98.4
July 3.	1.11	2.27	367	9	97.5
July 10.	1.28	1.07	154	14	90.9
July 17.	1.14	0 94	189	26	86.3
Average	1.14	1.83	507	14	96.4

During the first week with the largest number of bacteria in the lake water, the bacterial efficiency was 98.9. During the second week with the number of bacteria in the lake water reduced to less than a third, the numbers in the effluent were reduced in nearly the same proportion, and the efficiency remained at 98.4. During the third week, with nearly the same number in the water, there was a slight increase in the effluent and the efficiency fell to 97.5 per cent. For the three weeks the alum used was at the rate of 2.45 grains per gallon and the bacterial efficiency averaged 98.3 per cent.

In the fourth week, when the quantity of alum was reduced to 1.07 grains per gallon, the bacteria in the lake water fell to less than half, while those in the effluent increased considerably so that the bacterial efficiency fell to 90.9 per cent.; and in the fifth week, with only 189 bacteria in the lake water, the bacterial efficiency was further reduced to 86.3 per cent., 0.94 of a grain of alum being used. The decrease in bacterial efficiency with the decrease of alum is very marked.

It is much to be regretted that the numbers of bacteria in the lake water during this period were so low, as it is more difficult to secure a high percentage bacterial efficiency when the numbers in the raw water are low than under opposite conditions. On the other hand, the very marked increase in the numbers of bacteria in the effluents following the reduced quantity of alum, notwithstanding the lower numbers in the lake, is unmistakable evidence of reduced bacterial efficiency under these conditions.

The rate of filtration was, for mechanical filtration, extremely low, being much less than that usually recommended as suitable for use with these filters, and only slightly more than half as great as that used by Mr. Edmund B. Weston in experiments made by him with mechanical filters at Providence, Rhode Island, in 1893.

MICROSCOPICAL ORGANISMS.

The lake water was examined microscopically on several occasions and was found to contain large numbers of diatoms, algae and other organisms. The effluents were, with a single exception, entirely free from microscopical organisms of all kinds, showing a complete removal of these larger organisms, which are completely removed by almost any filtration.

EXAMINATIONS OF EFFLUENTS FOR ALUM.

During the first three weeks of the test, with the larger quantities of alum, samples of effluent were repeatedly examined for alum by the Logwood test, and with negative results throughout. For confirmation, samples were sent to Prof. Lord of Ohio State University, who reports that in the quantity of water submitted, namely one gallon, he was unable to find any alum.

CHEMICAL PURITY OBTAINED.

Samples of lake water and effluent were sent to Prof. Lord, who analyzed them with the following results:

	Lake water	Effluent.
Color	0.05	None.
Turbidity	Distinct.	None.
Sediment	Slight.	None.
Odor	Slight, earthy.	None.
Free ammonia	0.0015	0.0014
Albuminoid ammonia	0.0.46	0.0076
Nitrogen as nitrates	0.0170	0.0170
Nitrogen as nitrites	0.0003	Trace.
Total solids	27.30	23.00
Volatile solids	12.00	8.00
Chlorine	0.58	0.60
Oxygen consumed	0.23	0.13
Temporary hardness	9.40	7.40
Permanent hardness	1.60	3.00
Total hardness	11.00	10.40

These analyses show the removal of nearly half of the organic matters and all of the color, turbidity, sediment, and odor, and the effluent is entirely satisfactory from a chemical standpoint.

SUMMARY.

These tests show the removal of about 98 per cent. of the bacteria of the lake water when filtered at the rate of 1.1 gallons per square foot per minute and with the use of 2.5 grains of alum per gallon, and the removal of about 90 per cent. of the bacteria with a rate of filtration of 1.2 gallons per square foot per minute and a grain of alum per gallon. They also show that the alum was completely decomposed and did not appear in the effluent.

Respectfully submitted,
(Signed) ALLEN HAZEN.

A study of the bacterial results of filtration, as set forth in Mr. Hazen's report, shows no close relation between the number of bacteria in the applied lake water and in the filtrate. The greatest number found in the filtrate was 80 per c.c. on the afternoon of June 19th. The lake water at this time contained 3020 per c.c. on June 16, with 8392 bacteria in the lake water, the filtrate had only 27. Only three times during the run from June 14 to July 4, when between two and three grains of alum per gallon were being used, did the number of bacteria in the filtrate exceed 20 per c.c. The average for this period was nine.

With small quantities of alum the results were not so good, on one occasion, July 14, with 149 bacteria per c.c. in the applied water, and 0.95 grains of alum per gallon, the filtrate showed 42 per c.c., a reduction of but 71.8 per cent. It will be noted that there is a very close relation between the amount of alum used and the percentage of bacterial reduction.

The *rate* of filtration in sand filtration of water is of the utmost importance in controlling results. It no doubt plays an important role in mechanical filtration. The difference between minimum and maximum rates of filtration observed at Lorain, taking the weekly average of gallons per acre daily, was 13,000,000 gallons; i. e., 67,000,000 for the week ending June 19, and 80,000,000 for the week ending July 10. There was a decrease in bacterial efficiency during the period of maximum filtration, as compared with the period of minimum filtration of 9 per cent.; but this appears to have been principally or wholly due to the decrease in alum; for during the following week, when pumping was reduced to 72,000,000 gallons per acre daily, the bacterial efficiency continued to fall in proportion to the decrease in alum.

Mr. Hazen calls attention to the fact that the rate of filtration observed at Lorain was much lower than common in mechanical filtration. While the number of filters provided will, without doubt, filter satisfactorily a larger quantity of water than is being used at present, it would seem advisable to fix a limit beyond which the authorities of Lorain should not be allowed to go. It is equally important that the amount of alum used should not fall below a fixed standard. It is difficult to determine the maximum allowable rate of filtration, but I would suggest that for the present, at least, the maximum rate be fixed at 100,000,000 gallons per acre daily. It appears necessary, to attain safe results, that at least 2.5 grains of alum be used for each gallon of water filtered.

I have to recommend, therefore, that the change in the water supply of Lorain be approved, subject to the conditions that the maximum rate of filtration be 100,000,000 gallons per acre daily, and that not less than 2.5 grains of alum per gallon be used.

While recommending approval, I would suggest that the attention of the authorities at Lorain be called to the fact that their filters during other seasons of the year may be subjected to a severer trial than the one here reported; that so long as sewage is turned into the Black river the consumers of the lake water have to depend upon the honest, intelligent operations of these filters to protect them against disease; that the results of filtration can be known only by daily bacteriologal examinations, for which provisions should be made. I would add further that it be suggested that the best interests of the city demand that an effort be made to free Black river from sewage pollution; and that it be pointed out that, if this is not done, it may be found advisable that the water works intake be extended to a point where the danger from pollution is not so great.

Respectfully submitted,
C. O. Probst, Secretary.

List of Cities and Villages having Boards of Health with name of Health Officer.

December 31, 1897.

CITIES.

Akron	Dr. E. S. Underwood
Alliance	Dr. P. W. Welker
Bellaire	Dr. D. W. Boone
Bucyrus	Dr. W. A. Daugherty
Canton	Dr. J. F. Marchand
Chillicothe	Dr. E. F. Waddell
Cincinnati	Dr. J. M. Withrow
Circleville	Mr. Jno. L. Cummins
Cleveland	Dr. J L. Hess
Columbus	Dr. J. B. Schueller
Dayton	Dr. C. A. Bonner
Defiance	L. K. Miller, Clerk
Delaware	Dr. E. M. Semans
East Liverpool	Dr. C. B. Ogden
Fremont	Dr. O. C. Vermilya
Findlay	Mr. Amos Beardsley
Fostoria	Mr. W. N. Caldwell
Galion	Mr. A. Brokaw
Gallipolis	Dr. J. B. Alcorn
Greenville	Dr. C. N. Nolan
Hamilton	Dr. Walter Brown
Ironton	Dr. Gilman R. Davis
Kenton	Mr. C. J. Griffith
Lancaster	Dr. F. P. Stukey
Lima	Dr. L. F. Laudick
Mansfield	Dr. J. Harvey Craig
Marietta	Dr. B. F. Hart
Massillon	Dr. T. Clarke Miller
Martin's Ferry	Dr. J. W. Darrah
Marion	Mr. G. W. Blain
Middletown	Dr. Geo. D. Lummis
Mt. Vernon	Dr. H. W. Blair
Newark	Dr. Edwin Nichols
Norwalk	Dr. Edgar Martin
Piqua	Dr. F. E. Kitzmiller
Pomeroy	Dr. R. E. Stobart
Portsmouth	Dr. Jos. Swanders
Salem	Dr. F. T. Miles
Sandusky	Dr. C. Eugene Stroud
Steubenville	Mr. Henry Opperman
Springfield	Dr. Henry H. Seys
Tiffin	Dr. J. W. Russell
Toledo	Dr. J. T. Woods
Troy	Dr. T. M. Wright
Urbana	Dr. H. C. Houston
Warren	Dr. M. L. Williams
Washington C. H.	Mr. J. M. Edwards
Wellston	Mr. A. D. Ward
Wellsville	Mr. Jos. T. Warren
Wooster	Dr. Jos. E. Barrett

Xenia	Dr. A. D. DeHaven
Youngstown	Dr. H. E. Welch
Zanesville	Dr. H. T. Sutton

TOWNS.

Aberdeen	Dr. T. Heaton
Ada	Mr. W. H. Morrow
Adamsville	Mr. S. J. Lane
Adelphi	Mr. W. W. Rouse
Addystown	Mr. Hugh Kennedy
Albany (Lee P. O.)	Dr. A. F. Holmes
Alger	Dr. R. F. Coppess
Allentown	
Alexandria	
Alvordton	Dr. T. E. Schrider
Amelia	Dr. W. B. Doan
Andover	Mr. T. R. Wood
Anna	Dr. C. W. B. Harbour
Ansonia	Dr. H. A. Snorf
Antwerp	Mr. Chas. Roberts
Apple Creek	
Arcadia	Mr. J. E. Bowman
Arcanum	Mr. E. B. Hawley
Archbold	Mr. August Ruihley
Arlington	Mr. W. O. Sebastian
Arlington Heights	Mr. J. H. Francis
Ashland	Dr. D. L. Sampsell
Ashtabula	Dr. A. W. Hopkins
Ashley	Dr. H. N Coomer
Ashville	Mr. J. W. Johnson
Athalia	
Athens	Dr J. L. Henry
Attica	Dr. C. A. Force
Avon	Dr. T. B. Dailey
Bainbridge	Dr. R. H. McKee
Bakersville	Dr. C. R. Kitsmiller
Bairdstown	
Baltimore	Dr. C. M. Aelt
Barbertown	Mr. G. A. Shaw
Barnhill	Mr. S. Bartholemew
Barnesville	Dr. D. H. Crawford
Batavia	Mr. Joseph Bicking
Batesville	Mr. W. K. Cooper
Beach City	Mr. E. W. Spidell
Bealsville	Dr. John W. Reed
Beaver Dam	Dr. J. W. Wisely
Bedford	Mr. C. W. Keslake
Bellbrook	Mr. Rolla Davis
Belle Centre	Mr. S. Drummond
Bellefontaine	Dr. R. W. Chalfant
Belleville	Dr. W. M. Ridenour
Belpre	

Bellevue	Mr. John Battie
Belmore	Dr. G. B. Adrain
Belmont	Mr. David S. Pierce
Benton Ridge	Dr. R. O Whisler
Berea	Mr T. G. Card
Berne	Dr. G. G. Mallett
Berlin Heights	
Bethel	Dr. W. W. Smith
Bettsville	Mr. R. R. Ridley, Clerk
Beverly	Mr. F. A. Pomeroy
Blake's Mills	Mr. W. F. Reidenbach
Blanchester	Dr. N. B. VanWinkle
Bloomingburg	Mr. L. Dillinger
Bloom Center	Dr. O. C. Wilson
Bloomdale	Mr. E. Wineland
Bloomfield (Bloomingdale P. O.)	Mr. E. R. Blackburn, Cl'k
Bloomville	Dr. T. C. Loose
Bluffton	Dr. F. J. Baldwin
Bolivar	
Bond Hill	Mr. D. Edwin Murphy
Boston (Owensville P. O.)	
Botkins	Mr. Allen Wical
Bourneville	Dr. D. S. Smith
Bowerston	Dr. E. E. McPeck
Bowersville	Mr. Frank P. Sayrs
Bowling Green	Mr. A. Ordway
Bradford	Dr. H. M. Forman
Bradner	Mr. F. Kirk
Bridgeport	Dr. J. Andrew Heinlein
Brilliant	Dr. F. L. McDugal
Brooklyn	Mr. R. E. Stickney
Brookfield	Mr. A. W. McIntosh
Brookville	Mr. D. H. Cusick
Broughton	Mr. J. K. Sierer
Bryan	Mr. Nicholas Vineyard
Buckeye City	Mr. T. R. Neldon
Brink Haven	Mr. J. K. Butler
Burbank	Dr. M. H. Dodd
Butler	Dr. J. M. McLaughlin
Butlerville	
Burton	Dr. B. F. Ray
Byesville	Mr. T. C. Barnett
Cadiz	Dr. M. J. Lyons
Caldwell	Dr. O. O. McKee
Caledonia	Mr. Noah Lee
Calais	Mr. Josiah Thomas
Cambridge	Mr. I. A. Oldham
Camden	Mr. John Whittaker
Canal Dover	Mr. Henry Breitenstein
Canal Fulton	Mr. George Becker
Canal Winchester	Dr. W. S. Gayman
Canfield	Mr. A. D. Woods
Cannelville (Dillon's P. O.)	
Cardington	Mr. W. H. Van Horn

Carey	Dr. I. N. Zeis
Carroll	Dr. H. A. Brown
Carrollton	Dr. A. H. Hise
Carthage	Mr. Harry Ross
Casstown	Dr. S. H. Barroughs
Catawba	Dr. T. D. Beach
Cecil	Mr. H. L. Weaver
Cedarville	Mr. T. V. Iliff
Celina	Dr. L. P. Lisle
Centerburg	Mr. J. C. Coe
Centerville	
Chagrin Falls	Dr. W. H. Walters
Chambersburg (Eureka P. O.)	
Chardon	Mr. F. S. Pomeroy
Chatfield	Dr. Jos. M. Mollenkop
Chester Hill	Dr. J. A. Penrose
Chesterville	Mr. John Gleason
Chicago Junction	Dr. D. H. Young
Chickasaw	
Clarington	Dr. Jno. E. Morrill
Clarksville	Dr. Z. T. Garland
Clarksburg	Dr. J. F. Simpkins
Clearport	Dr. J. T. Hufford
Cleves	Dr. W. C. Hughes
Clifton (Green Co.)	Dr. D. E. Spahr
Clinton	
Coalton	Mr. M. K. Glenn
Clyde	Mr. F. G. Tuttle
Coldwater	
College Hill	Mr. E. F. Smith
Collinwood	Dr. A. L. Waltz
Columbiana	Mr. George Roninger
Columbus Grove	Dr. W. H. Begg
Commercial Point	Mr. W. A. Smith
Congress	
Conneaut	Dr. D. S. Cossitt
Continental	Mr. S. H. Bretz
Convoy	Dr. R. L. Crooks
Coolville	Dr. A. M. Frame
Copley	Mr. O. E. Arnold
Corning	Mr. J. W. Stallsmith
Cortland	Dr. K. W. Lynn
Coshocton	Mr. J. E. Foster
Covington	Mr. George Flammer
Crestline	Mr. A. J. Cover
Creston	
Cridersville	Mr. C. H. Thomas
Croton	Dr. G. M. Lyman
Crown City	
Crooksville	Mr. W. C. Young
Cumberland	Mr. George E. McEndree
Custar	Dr. M. Woeline
Cuyahoga Falls	Dr. I. N. Reed
Cygnet	Mr. Jas. H. Ferguson
Dalton	Mr. A. H. Arick

Dallas	
Danville	Dr. C. R. Bradfield
Darbyville	Dr. C. R. Smith
Deersville	Dr. Frank James
DeGraff	Dr. D. W. Richardson
Delta	Dr. W. E. Ramsey
Delhi	Mr. M. L. Andrews
Dell Roy	Dr. Isaac Yant
Delphos	Dr. J. M. Marsh
Dennison	Dr. L. H. Hughes
Deshler	Dr. J. L. Lathrop
Dexter City	Dr. C. A. Poindexter
Dillon's	Dr. G. B. Trout
Donnelsville	Mr. Adam Cornwell
Doylestown	Dr. A. E. Stepfield
Dresden	Mr. George Sparks
Ducan's Falls	
Dublin	Dr. R. M. Merryman
Dunkirk	Dr. C. C. McLaughlin
Dupont	Mr. A. Bennett
East Cleveland	U. C. Hatch, Clerk
East Fairfield	Dr. G. H. Albright
East Palestine	Mr. W. H.Olloman
East Springfield	Dr. George R. Wycoff
Eaton	Mr. F. Campbell
Edgerton	Dr. C. Hathaway
Edison	Dr. J. H. Jackson
Edon	Mr. R. H. Chisholm
Eldorado	Dr. J. A. Davison
Elida	Mr. A. J. Myers
Elmore	Dr. S. T. Dromgold
Elyria	Dr. W. F. McLean
Elmwood Place	Dr. Jno. G. Reed
Empire	
Enon	Mr. Jas. P. Pierce
Euclid	
Eureka	
Fairfield	Mr. Samuel Wilson
Fairport	Mr. A. J. McCue
Fairview	Mr. Jno. H. Hunt
Farmersville	Mr. Geo. W Neushawg
Fayette	Mr. W. O. Ford
Fayetteville	
Felicity	Mr. O. D. Hicks
Fernbank	Rev. A. C. Thompson
Fitchville	Dr. E. L. Burton
Fletcher	Dr. J. Funderburg
Florida	
Flushing	Dr. A. B. Hobson
Forest	Dr. W. T. Gemmill
Fort Jennings	Dr. J. F. George
Fort Recovery	Mr. John Watkins
Fowler	Mr. C. D. Williamson
Frankfort	Dr. J. O. Hoffhine
Franklin	Dr. D. A. Williams

Frazeysburg	Mr. Sam'l McGinnis
Fredericksburg	Mr. L. C. Miller
Fredericktown	Mr. W. F. Gibson
Freeport	Dr. W. A. Zellers
Fultonham	Dr. C. B. Moore
Gahanna	Mr. Sam'l Cashner, Mayor
Gambier	Dr. E. J. Hyatt
Garrettsville	Dr. C. A. Snow
Geneva	Dr. G. G. Biggar
Genoa	Dr. J. K. Teetzell
Georgetown	Dr. R. B. Fee
Germantown	Mr. Sam'l A. Bausman
Gettysburg	
Gibsonburg	Mr. A. E. Ferguson
Gilboa	Dr. M. A. Darbyshire
Girard	Mr. D. R. Williams
Glandorf	Mr. Jacob Meyerhofer
Glendale	Mr. E. A. Sayre
Glenville	Mr. C. Favargue
Glouster	Dr. J. M. Rhodes
Gnadenhutten	
Good Hope	Mr. D. C. Somers
Grafton	Mr. Jos. Hartman
Grand Rapids	Mr. Wm. Mailey
Grand River	Mr. James Averille
Gratis P. O.	Mr. H. Bowman
Granville	Dr. O. J. Wood
Graysville	Rev. W. J. Raybould
Green Camp	Mr. I. A. Leaverton
Greenfield	Mr. Scott Powell
Green Spring	Dr. H. L. S. Hinkley
Greenwich	Mr. F. L. Ward
Grove City	Dr. Charles McGiven
Grover Hill	Mr. G. H. Hoyt
Groveport	Dr. C. R. Clement
Hagermans	Dr. E. H. Black
Hamden	Mr. G. A. F. Smith
Hammondsville	
Hamersville	
Hamler	Mr. George P. Butler
Hanging Rock	Mr. Joseph Kinkaid
Hanoverton (Hanover)	Dr. Wm. D. McCleary
Harlem Springs	
Harmer	Mr. John W. Knox
Harrison	Mr. Thos. Bowles, Sec'y
Harrisburg	Mr. C. H. Copeland, Clerk
Harrisville	Dr. G. H. Colville
Harrod	Mr. C. S. Smith
Hartford (Croton P. O.)	
Hartwell	Dr. Lincoln Phillips
Haskins	Dr. E. J. Greenfield
Harveysburg	Dr. J. E. Witham
Havensport	
Hayesville	Mr. Dill Andress
Hebron	Dr. R. M. Bonar

Herring	Dr. R. McHill
Hicksville	Mr. Nelson Smith
Higginsport	Dr. J. H. Doland
Hilliards	Dr. N. P. Davidson
Hillsboro	Dr. W. Hoyt
Holgate	Dr. J. G. Archer
Hollansburg	Dr. A. W. Meek
Home City	Dr. B. F. Lehman
Holmesville	Dr. R. P. Loller
Hopedale	Dr. L. A. Crawford
Hoytsville	Dr. C. F. Bell
Hubbard	Dr. G. R. Stevenson
Hudson	Dr. L. D. Osborne
Huntsville	Dr. J. S. Montgomery
Huron	Dr. N. E. Woessner
Hyde Park	Dr. Arthur L. Brown
Irondale	Mr. Alex. Hamlin
Independence (Cuyahoga Co.)	Mr. James C. Neville
Ithaca	Dr. J. C. Hamilton
Jackson	Mr. C. H. Palmer
Jacksonboro	
Jacksonville	
Jackson Centre	Dr. C. W. Moots
Jamestown	Mr. Elmer Stinson
Jefferson	Dr. A. L. Arner
Jeffersonville	Dr. D. H. Rowe
Jenera	Mr. C. H. Heldman
Jeromeville	
Jerusalem	Mr. J. A. Latham
Jerry City	Mr. U. Shasteen
Jersey	
Jewett	Mr. J. R. Roberts
Johnstown	Dr. C. A. Burke
Johnsonville	Mr. E. C. Hitchcock
Junction City	Dr. J. A. Moody
Kalida	Mr. Jefferson Ladd
Kelley's Island	Dr. J. J. Klein
Kent	Mr. L. G. Reed
Killbuck	Dr. T. A. Ablett
Kimbolton	Dr. S. M. Mehaffey
Kingston	Dr. C. C. Hatfield
Kirby	Dr. E. E. Burns
Lafayette (Herring P. O.)	
Lakewood	
La Grange	Dr. G. N. Snyder
Larue	Mr. E. Anderson
Latty	Dr. J. A. Monsor
Laurelville	Mr. Bernard Friend
Laura	Mr. W. S. Olvin
Lebanon	Dr. F. H. Frost
Leesburg	Dr. H. A. Beeson
Leesville	
Leetonia	Dr. H. B. Kurtz
Leipsic	Dr. John McClung
Lewisburg	Mr. E. E. Black

Lewisville	Mr. M. Y. Thornbery
Lexington	Dr. J. B. Stober
Liberty Center	Mr. D. K. Bowker
Limaville	
Lindsey	
Lisbon	Mr. D. H. Eells
Lithopolis	Mr. J. E. Holmes
Little Sandusky	
Lockington	
Lockland	Mr. M. Guth
Lockville	
Lodi	Mr. A. O. Nead
Logan	Dr. N. H. Blosser
London	Dr. J. F. Kirkpatrick
Lorain	Dr. S. S. Cox
Loramies	Dr. Thomas Walkup
Loudonville	Mr. Wm. Conrad
Louisville	Dr. J. H. Rogers
Loveland	Dr. J. O. Wakefield
Lowell	Mr. Willard H. Davis
Lowellville	Mr. J. H. McWilliams
Lucas	
Lynchburg	Mr. C. A. Michael
Macksburg	Mr. R. C. Smithson
Madison	Dr. C. H. Quayle
Madisonville	Dr. E. A. Flinn
Magnetic Springs	Dr. C. L. Schwartz
Magnolia	Mr. Wm Judd
Maineville	Mr. E. S. Garwood
Malta	Mr. John Davis
Malvern	Dr. E. C. Ross
Manchester	Dr. R. A. Stephenson
Mantua Station	
Mapleton	
Marblehead	Mr. A. J. Clemons
Marice City (Continental P. O.)	
Marlborough	
Marseilles	Mr. Jno. C. Wartley
Marshallville	Dr. H. B. Willford
Martinsburg	
Martinsville	Dr. W. K. Ruble
Marysville	Dr. Jno. E. Wood
Mason	Dr. C. T. Hall
Maumee	Mr. D. H. Perrin, Secy.
Marengo	Dr. Edgar Kerr
McArthur	Mr. David Lantz
McClure	Mr. Jas. A. Randolph
McComb	Dr. J. A. Thompson
McConnellsville	Dr. J. D. Maris
McGuffey	Dr. J. B. K. Evans
Mechanicsburg	Dr. J. T. Sideuer
Mechanicstown	Dr. Jno. M. Watt
Medina	Mr. A. A. Foskett
Melrose	Mr. T. J. Myers
Mendon	Dr. J. M. Miller

Mentor	Dr. Lester H. Luse
Metamora	Dr. C. Heffron
Midland City	Dr. E. C. Van Gundy.
Middleburg (Middle Creek P. O.)	
Middleport	Dr. David Sisson.
Middle Branch	
Middle Point	
Miamisville	
Miamisburg	Dr. Henry Schoenfield
Milan	Mr. Richard Rawl
Milford	Dr. F. C. Curry
Milford Center	Mr. Jos. Snider
Miltonsburg	Dr. J. H. Pugh
Milton	
Milton Center	Dr. J. F. Noble
Millbury	
Milledgeville	
Miller's	Mr. M. McCown
Millersburg	Dr. D. L. Olmsted
Millersport	
Mineral Point	Mr. J. C. James
Mineral Ridge	Dr. Jas. E. Gaston
Minerva	Mr. Thos. J. Rouch
Minersville	
Mingo Junction	Mr. F. S. Buchanan
Minster	Dr. R. A. Rulmann
Mohican	
Monroeville	Dr. E. R. Kreider
Montpelier	Dr. H. W. Wertz
Montgomery	
Morristown	Mr. R. S. Hazlett
Morrow	Dr. Benj. F. Stiles
Moscow	Mr. J. R. Wiley
Mt. Airy	
Mt. Blanchard	Dr. J. Odenbaugh
Mt. Cory	Dr. W. E. Clymer
Mt. Eaton	
Mt. Healthy	Mr. Frederick Walker
Mt. Gilead	Mr. R. C. Spear
Mt. Pleasant	Mr. Geo. A. Walker
Mt. Orab	Mr. Jno. Walker
Mt. Sterling	Dr. R. H. Trimble
Mt. Washington	Dr. J. W. Dodds
Mt. Victory	Dr. A. N. Titsworth
Murray City	Dr. J. Dillinger
Mutual	Mr. C. M. Goul
Napoleon	Mr. D. H. Hancock
Nashport	Mr. H. L. Curtis
Nashville	Mr. J. A. Underwood
Navarre	Mr. John Bailiss
Nelsonville	Dr. A. L. Pritchard
Nevada	Dr. S. S. Barrett
Neville	Dr. N. S. Hill
New Albany	Dr. C. L. Dolle
New Alexandria	

New Athens	Dr. Albert Dickerson
New Baltimore	
New Bloomington (Agosta P. O)	
New Berlin	
New Bremen	Dr. M. S. Eckermeyer
Newburg	Mr. Chas. Radcliff
New Burlington	Dr. U. G. Murrell
New Carlisle	Dr. Ben Davis
Newcomerstown	Dr. J. R. McElroy
New Concord	Mr. W. M. Smith
New Franklin	
New Holland	Mr. Jas. Q. Shephard
New Knoxville	Dr. H. E. Fledderjohann
New Lebanon	Mr. Samuel Bowman
New Lexington	Mr. Lawrence Keating
New London	Mr. A. M. Turner
New Madison	Mr. J. F. S. Hageman
New Matamoras	Mr. Theo. Heddleston
New Moorefield	
New Paris	Dr. Louis Dunn
New Petersburg	
New Philadelphia	Dr. Geo. N. Peck
New Richmond	Dr. T. J. Mullen
New Reigel	Mr. John Moes, Jr.
New Stark	
New Straitsville	Mr. Marion Truex
New Salem	
Newton Falls	Mr. A. C. Lawton
New Vienna	Dr. Geo. R. Conard
New Washington	Mr. Geo. B. Wolf
Ney	Dr. P. M. Lehman
Niles	Dr. C. C. Williams
North Amherst	Mr. L. Horn
North Baltimore	Dr. J. E. Somers
North Bend	
North Hampton	Dr. E. B. Davis
North Lindale	Mr. H. Gearley
North Lewisburg	Mr. A. Spain
North Robinson	Dr. C. C. Mandeville
Norwich	Mr. L. D. Wilson, Sec'y
Norwood (Hamilton Co.)	Dr. J. C. Cadwallader
Oak Harbor	Dr F. S. Heller
Oak Hill	Mr. Wm. M. Morgan
Oakwood	Mr. W. E. Osborne
Oakland	
Oakley	
Oberlin	Mr. E. L. Burge
Ohio City	Mr. James McLean
Olmstead Falls	Mr. C. H. Barnum
Orangeville	
Orrville	Dr. A. A. Brooks
Osborne	Dr. R. O. Hoover
Osgood	Mr. J. W. Sprague
Osnaburg	Dr. W. D. Davis
Ostrander	Dr. A. J. Pounds

Ottawa	Mr. Frank Light
Ottoville	Dr. A. Binder
Otway	Mr. Alfred Jones
Owensville	Dr. G. G. Rutledge
Oxford	Dr. E. L. Hill
Palestine	
Patriot	
Patterson	Mr. J. C. Gardner
Painesville	Dr. Geo. M. Cranston
Paris	
Pataskala	Mr. F. McConnaughey
Paulding	Dr. J. V. Fauster
Payne	
Peebles	Mr. Jas. W. Yankie
Pemberville	Mr. Jno. Seiler
Peninsula	Dr. W. N. Boerstler
Perrysburg	Dr. J. H. Reinfrank
Perrysville	Mr. Geo. W. Shehan
Petersburg (Coal Grove P. O.)	
Phillipsburg (Centre P. O.)	
Philo (Taylorsville)	Dr. J. H. Green
Pickerington	
Pierce (Stark Co.)	
Piketon	Dr. A. E. Bumgarner
Pioneer	Mr. John W. Baker
Plain City	Dr. M. J. Jenkins
Plainfield	Mr. J. S. Jenkins
Pleasant Hill	Dr. A. J. Bausman
Pleasant Ridge	Mr. C. W. Acomb
Pleasantville	Dr. W. E. Baker
Plymouth	Dr. M. Vance
Poland	Dr. C. R. Justice
Polk	Dr. W. H. Rhinehart
Portage	Dr. Thos. W. Knight
Port Clinton	Dr. Paul de la Barre
Port Jefferson	Dr. S. S. Crumbaugh
Port Washington	Dr. M. W. Nargney
Port Williams	Mr. S. L. Thorpe
Port Union	
Powhatan Point	Dr. J. S. Boone
Proctorville	Mr. Amos Ripley
Prospect	Dr. C. M. C. Thomas
Put-in-Bay	Mr. Hugo Steiert
Quaker City	Dr. F. S. Miskimen
Quincy	Mr. R. T. Cretcher
Racine	Dr. C. N. Hayman
Rarden	Dr. R. A. Foster
Rawson	Mr. Michael Smith
Ravenna	Mr. Lee M. Wood
Reading	Mr. George Mages
Rendville	Dr. S. S. Jordan
Republic	Mr. H. V. Bishop
Reynoldsburg	Dr. F. G. Taylor
Richmond (Grand River P. O.)	
Richmond	Dr. Samuel Rothacker

Richville	
Richwood	Mr. J. J. Monroe
Ridgeway	Dr. E. B. Crow
Ringgold	
Ripley	Dr. Geo. P. Tyler
Rising Sun	Mr. J. F. Petese
Robertsville	
Rockford	Dr. T. G. McDonald
Rochester	Dr. J. C. Dignan
Rock Creek	Dr. W. S. Weiss
Rocky Ridge	Mr. William Schlegel
Rogers	Mr. C. T. McArton
Roseville	Dr. O. M. Norman
Rossville (Hagerman P. O.)	
Royalton	
Rushsylvania	Mr. J. S. Mallory
Rushville	Dr. W. G. Lewis
Russellville	
Sabina	Mr. Jared L. Johnson
Salesville	Mr. W. D. Beeks
Salineville	Mr. James Carter
Sarahsville	Dr. W. S. Williams
Savannah	Mr. L. S. Cowie
Scio	Mr. L. O. Rippeth
Sciotoville	
Scott	Mr. T. J. Lewellyn
Sedalia	Dr. E. B. Mead
Senecaville	Dr. W. Scott
Sekitan (Addystown P. O.)	
Seville	Dr. P. E. Beach
Seven Mile	
Shane's Crossing (Rockford P. O.)	
Shawnee	Dr. Jno. I. Davis
Shelby	Dr. W. S. Anderson
Sharon	Mr. J. A. Reid
Sherodsville	Mr. Wm. H. Watkins
Sherwood	Dr. E. J. Potter
Shiloh	Dr. L. F. Henry
Shreve	Mr. J. D. Barcus
Sidney	Mr. Wm. C. Wyman
Smithfield	Dr. Wm. H. Wood
Smithville	Mr. A. K. Schaaf
Somerset	Mr. Frank Sutton
Somerville	Mr. Alfred Kapp
South Bloomfield	Dr. C. E. Blacker
South Brooklyn (Brooklyn)	
South Charleston	Dr. M. H. Collins
South Lebanon	Mr. G. W. Snook
South Point	Dr. James Black
South Salem	Dr. E. C. Lumbeck
South Solon	Dr. W. F. McCormick
South Webster	
Sparta	Mr. S. G. Fowls

Spencerville	Dr. S. C. Sims
Springborough	Mr. J. B. Haines
Spring Hills	Dr. S. H. Elliott
Spring Valley	Dr. S. E. Dyke
St. Bernard	Dr. S. B. Howard
St. Clairsville	Dr. D. L. Walker
St. Mary's	Mr. J. K. Thomas
St. Paris	Dr. C. A. Offenbacher
St. Louisville	
Stewart	Mr. G. H. Hawk
Stockport	Mr. M. C. Riley
Strasburg	Dr. J. C. Schutzbach
Stouts	Dr. S. B Grimes
Stoutsville	
Stryker	Mr. George Snyder
Summerfield	Mr. John E. Mosely
Summerford	
Sugar Grove	Dr. E. R. Brown
Sunbury	Dr. G. H. Gerhardt
Swanton	Dr. A. B. Lathrop
Sycamore	Mr. R. S. Galleher
Syracuse	
Sylvania	Mr. Geo. A. Crandall
Tarlton	Mr. J. B. Grove, Clerk
Taylorsville (Philo P. O.)	
Tippecanoe City	Mr. Wm. H. Strader
Tiltonville	
Tiro	Dr. W. H. Guiss
Thornville	Dr. W. T. Stevens
Thurman	Dr. Gomer E. Jones
Thurston	
Tontogany	Mr. R. J. Collin, Mayor.
Toronto	Dr. W. S. Carroll, Sec'y
Trenton	
Trimble	Dr. H. D. Danford
Trimway	Mr. Leroy Rose
Tuscarawas	Dr. C. D. Kurtz
Union City (Ind.)	Mr. D. J. Wise
Uniontown (Fultonham P. O.)	
Unionville	
Unionville Center	
Uhrichsville	Dr. Jas. A. McCollom
Utica	Dr. G. W. Garrison
Upper Sandusky	Dr. O. C. Stutz
Van Buren	Mr. J. S. Foster
Vandalia	Dr. W. H. Riley
Vanlue	Dr. Jas. L. Schrotz
Van Wert	Dr. E. L. Wilkinson
Vermillion	Mr. Henry Schmall
Versailles	Dr. Wm. C. Gutermuth
Vinton	Mr. Robert B. Carter
Wadsworth	Dr. J. F. Detweiler
Waldo	Dr. J. R. Hipple
Wapakoneta	Mr. A. Kohler
Warsaw	Mr. S. W. Willis

Washington	Mr. S. B. Lawrence
Washingtonville	Dr. J. C. Gorsuch
Waterloo	
Waterville	Dr. Samuel Downs
Wauseon	Dr. J. H. Waddell
Waverly	Mr. George D. Emmitt
Waynesburg	Dr. E. G. McCormick
Waynesfield	Dr. Silas McPherson
Waynesville	Dr. W. E. Oglesbee
Webster	Mr. J. F. Byrd
Wellington	Mr. M. W. Lang
West Alexandria	Mr. L. J. Ashworth
West Cairo	Dr. G. W. Henderson
West Carrollton	Mr. Jas. B. Manly
West Chester	
West Elkton	Dr. Elwood Holaday
Westerville	Mr. James D. Budd
Western Star	Mr. P. A. Johnson
West Jefferson	Dr. W. E. Postle
West Leipsic	
West Liberty	Dr. R. M. Fulwider
West Manchester	Mr. David E. Allen
West Mansfield	Mr. M. Bozeman
West Middleburg	
West Mill Grove	
West Milton	Dr. Gainor Jennings
West Salem	Dr. D. W. Carver
Weston	Dr. G. B. Spencer
West Union	Dr. W. K. Coleman
West Unity	Mr. J. H. Tiddler
West Wheeling	
Wheelersburg	
Whitehouse	Dr. C. H. Ellis
Wilkesville	Dr. E. M. Dixon
Williamsburg (Batesville P. O.)	
Williamsport	Dr. G. C. Hayes
Windham	Mr. H. J. Higby
Willoughby	Dr. Geo. B. Durban
Willshire	Dr. J. F. Shaffner
Wilmington	Dr. G. M. Austin
Winchester	Dr. C. W. Salisbury
Winton Place	Mr. John R. Froome
Woodsfield	Mr. A. S. Baker
Woodstock	Mr. D. P. Smith
Woodville	Mr. Samuel Crawford
Worthington	Dr. D. H. Welling
Wyoming	Mr. A. M. Van Dyke
Yellow Springs	Dr. W. M. Haffner
York	
Zanesfield	
Zaleski	Dr. F. M. Smallwood
Zoar	Dr. Clemens Breil

Abstract of the Reports of Deaths, and their Causes, in the Following Cities of Ohio, during the Month of January, 1897.

Cities of 10,000 inhabitants (census of 1890) or over.	Population (estimated).	Total deaths, all causes.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total zymotic diseases.	Croup and diphtheria.	Cholera infantum.	Cerebro-spinal meningitis.	Cholera morbus.	Diarrhœal diseases.	Dysentery.	Malarial fevers.	Measles.	Puerperal fever.	Scarlet fever.	Tonsillitis.	Typhoid fever.	Whooping cough.	Total constitutional diseases.	Cancer.	Phthisis pulmonalis.	Total local diseases.	Apoplexia.	Bright's disease.	Bronchitis.	Convulsions.	Gastritis and peritonitis.	Heart disease.	Meningitis.	Pleurisy.	Pneumonia.	Total developmental diseases.	Total violence.	Premature and still births.
*Akron	39,545	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Canton	44.556	34	9.16	5	10	5	3	...	...	...	...	...	...	...	...	...	...	2	...	4	2	2	13	...	3	...	4	1	1	2	...	2	11	1	...
Chillicothe	11,539	18	18.72	...	...	7	2	...	1	...	...	...	...	...	...	...	...	...	...	3	...	1	3	...	1	...	...	...	...	...	...	1	3	1	4
Cincinnati	344,293	521	18.16	84	51	57	18	1	...	...	...	2	...	1	...	3	...	9	1	132	17	81	292	8	5	41	10	17	26	16	...	67	23	17	45
Cleveland	373,600	344	11.05	52	33	46	24	...	...	...	1	...	...	...	1	...	...	5	3	50	8	20	174	6	6	16	27	11	17	5	1	29	31	10	42
Columbus	128,153	133	12.45	15	11	25	3	...	...	..	...	...	...		...	2	...	9	...	27	3	13	65	2	1	1	1	3	23	5	...	15	11	4	4
Dayton	84,426	88	12.51	11	10	14	8	...	...	...	1	...	...	...	...	1	...	1	1	22	4	15	38	...	...	3	1	1	10	1	...	9	3	5	7
East Liverpool	17,595	10	6.82	2	1	1	...	...	...	...	...	1	...	...	...	...	...	...	...	3	...	3	2	...	...	...	...	...	1	...	...	1	...	...	...
Findlay	20,000	20	12 00	4	5	2	...	...	...	...	...	2	...	...	...	...	...	...	...	5	...	4	8	...	...	...	...	...	2	1	...	1	3	2	...
Hamilton	22,771	24	12.65	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4	...	2	8	1	...	...	2	1	1	2	...	...	4	2	3
Ironton	12,681	16	15.14	2	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	11	1	...	1	...	1	2	3	...	3	1	1	4
Lima	26,966	22	9.79	5	3	3	1	...	...	...	...	...	...	...	...	...	...	1	...	5	...	4	2	...	1	...	...	...	...	1	...	...	12	...	...
Mansfield	16,765	20	14.32	5	3	5	4	...	1	...	...	. .	...	...	...	...	...	...	...	4	1	2	9	...	...	1	1	2	...	...	...	2	1	1	2
Massillon	13,255	9	8.15	...	...	3	...	...	...	...	...	...	...	...	...	...	...	...	1	2	...	2	3	1	...	...	...	...	...	...	...	...	.. ..	1	...
Newark	18.833	14	8.92	2	1	3	3	...	...	...	...	...	...	...	...	..	...	...	...	...	...	...	8	2	...	...	...	...	3	1	...	2	3	...	...
Portsmouth	13,205	24	21.81	2	1	3	...	...	...	...	...	...	...	...	...	...	...	2	...	1	...	1	17	1	2	1	...	...	4	...	...	8	3	...	2
Sandusky	20,570	25	8.75	2	3	11	8	. .	...	...	...	...	...	...	2	...	...	. .	...	2	...	1	9	...	1	4	...	...	4	...	...	...	3	...	1
Springfield	43,121	51	14.19	8	4	8	6	...	...	...	...	...	...	...	1	...	...	...	...	6	1	4	25	...	...	6	1	3	4	1	...	8	7	5	...
Steubenville	14,386	7	5.84	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4	...	. ...	1	...	1	...	...	1	... ..	2	...	...
Tiffin	13,469	14	12.47	1	...	...	...	...	...	...	...	...	...	...	...	...	..	...	...	1	...	1	7	...	...	1	...	4	2	...	...	...	5	...	1
Toledo	114,352	125	13.12	19	11	16	2	...	...	...	...	...	2	1	...	1	..	4	1	6	...	8	63	2	1	3	3	8	10	5	...	10	20	7	21
Youngstown	56,810	47	9.93	11	10	8	1	...	...	...	...	...	...	...	...	2	...	4	...	2	1	1	26	...	1	2	3	1	3	2	...	8	7	1	7
Zanesville	23,307	31	15.96	...	5	4	...	...	...	...	...	...	...	...	...	...	...	...	...	6	2	3	17	1	3	...	...	...	5	...	...	6	...	3	...
Totals	1 434 654	1,597	13.36	231	165	222	83	1	2	...	2	5	2	2	4	9	...	37	7	285	39	168	804	25	25	81	53	54	118	45	2	172	153	61	143

*No report received. Not included.

Abstract of the Reports of Deaths, and their Causes, in the following Cities of Ohio, during the Month of January, 1897.

Cities of less than 10,000 inhabitants. (census, 1890)	Population (estimated).	Total deaths, all causes.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total zymotic diseases.	Croup and diphtheria.	Cholera infantum.	Cerebro-spinal meningitis.	Cholera morbus.	Diarrhœal diseases.	Dysentery.	Malarial fevers.	Measles.	Puerperal fever.	Scarlet fever.	Tonsillitis.	Typhoid fever.	Whooping cough.	Total constitutional diseases.	Cancer.	Phthisis pulmonalis.	Total local diseases.	Apoplexia.	Bright's disease.	Bronchitis.	Convulsions.	Gastritis and Peritonitis.	Heart disease.	Meningitis.	Pleurisy.	Pneumonia.	Total developmental diseases.	Total violence.	Premature and still births.
Alliance	10,758	11	12.27	2	2	1	1	...	...	...	...	...	...	...	...	...	...	...	...	2	1	1	7	...	...	...	...	...	...	...	...	2	1	...	...
Bellaire	11,534	12	12.47	5	1	2	...	...	...	...	...	1	...	...	...	...	...	1	...	...	...	...	8	1	1	1	...	1	...	...	...	3	2	...	3
Bucyrus	8,147	9	13.26	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	4	2	2	4	...	...	1	...	...	2	...	...	1	...	...	...
Circleville	7,116	8	13.49	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	2	6	...	...	1	...	...	3	1	...	1	...	...	...
*Defiance	9,257	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Delaware	9,304	13	16.87	2	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	2	1	1	6	1	...	1	...	2	...	...	...	2	3	...	1
Fostoria	11,408	3	3.16	1	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	1	...	1	1	...	...	...	1	...	1	...	...	...	...	...	1
Fremont	6,343	11	20.81	2	3	1	1	...	...	...	...	...	...	...	...	...	...	...	...	3	2	1	2	...	...	...	...	...	...	1	...	...	2	3	...
Galion	6,859	13	22.64	1	1	4	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	1	...	...	...	...	...	...	...	...	6	1	...
Gallipolis	4,568	11	28.88	...	...	5	...	...	...	...	...	...	...	...	1	...	...	...	...	2	...	...	4	...	...	...	...	...	1	...	...	2	...	...	...
Greenville	7,478	3	4.80	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	...	1	...	...	...	1	...	2	...	...	...
*Kenton	7,091	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
*Lancaster	8,130	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Marietta	11,114	14	15.11	6	...	2	...	1	...	...	...	...	...	...	...	...	...	1	...	...	...	...	10	1	1	1	2	...	1	1	...	3	1	1	...
Marion	14,163	7	5.93	...	...	3	2	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	4	...	...	...	...	...	...	1	...	...	...	...	...
Martin's Ferry	8,823	13	17.68	2	3	1	...	...	...	...	...	...	...	...	...	...	...	1	...	3	...	3	9	1	...	...	...	4	2	1	...	1	...	...	1
Middletown	11,102	8	8.65	2	...	1	...	...	...	...	1	...	...	...	...	...	...	...	...	2	1	...	5	1	...	...	...	...	...	...	...	...	...	...	...
Mt. Vernon	6,639	9	16.27	1	...	1	...	...	...	1	...	...	...	...	...	...	...	...	...	3	2	1	3	1	...	...	...	...	1	...	...	1	...	...	1
Norwalk	8,464	5	7.09	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	2	3	...	1	...	...	...	...	...	1	1	...	...	...
Piqua	12,114	15	14.86	2	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	3	...	3	5	1	...	...	2	1	...	...	...	1	2	1	...
Pomeroy	4,219	6	17.07	...	2	2	...	...	1	...	...	...	...	...	...	...	...	1	...	1	...	1	2	...	...	...	...	...	1	...	...	1	...	...	2
Salem	7,425	6	9.69	1	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	4	...	1	...	...	1	1	...	...	...	...	...	2
Troy	5,051	7	16.63	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	6	...	...	...	...	...	...	...	...	6	...	1	...
Urbana	6,696	10	17.92	...	1	1	1	...	...	...	...	...	...	...	...	...	...	...	...	4	...	4	4	...	1	...	...	...	2	...	...	...	1	...	...
Warren	8,075	8	10.65	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	1	2	4	1	...	...	...	...	...	...	...	1	1	...	...
Washington C. H.	7,668	7	10.95	2	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	1	1	5	...	...	...	...	...	1	...	...	3	...	...	...
Wellston	12,733	6	5.66	...	...	3	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	3	...	...	...	1	1	...	...	...	1	...	...	1
Wellsville	7,142	4	6.70	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	2	...	2	1	...	...	1	...	...	...	...	...	...	...	...	...
Wooster	5,944	5	10.09	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5	3	...	...	...	...	1	...	...	1	...	...	...
Xenia	7,499	12	19.20	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	6	...	5	4	...	...	...	...	...	1	...	...	3	2	...	...
Totals	228,386	236	12.40	33	14	34	11	1	2	1	1	1	...	...	1	...	...	5	1	48	12	32	120	12	5	7	6	10	18	6	1	35	21	7	12

*No report received. Not included.

Abstract of the Reports of Deaths, and their Causes, in the Following Cities of Ohio, during the Month of February, 1897.

Cities of 10,000 inhabitants (census 1890) or over.	Population (estimated.)	Total deaths, all causes.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total zymotic diseases.	Croup and diphtheria.	Cholera infantum.	Cerebro-spinal meningitis.	Cholera morbus.	Diarrhœal diseases.	Dysentery.	Malarial fevers.	Measles.	Puerperal fever.	Scarlet fever.	Tonsillitis.	Typhoid fever.	Whooping cough.	Total constitutional diseases	Cancer.	Phthisis pulmonalis.	Total local diseases	Apoplexia.	Bright's disease.	Bronchitis.	Convulsions.	Gastritis and peritonitis.	Heart disease.	Meningitis.	Pleurisy.	Pneumonia	Total developmental diseases.	Total violence.	Premature and still births.
*Akron	39,515	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Canton	44,556	31	8.35	3	1	7	1	...	...	...	...	...	...	...	...	...	...	6	...	4	2	2	5	1	2	...	1	...	1	...	...	...	15	...	...
Chillicothe	11,539	13	13.52	...	...	5	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	6	1	...	...	...	...	2	3	...	...	...	...	3
Cincinnati	344,293	425	14.81	74	44	53	13	1	1	...	2	1	...	...	1	1	1	8	1	90	6	58	228	14	6	29	7	9	25	15	1	52	33	21	40
Cleveland	373,600	404	12.98	69	37	45	19	...	...	...	1	...	...	...	1	...	...	2	...	52	13	22	216	9	6	9	33	5	36	12	2	55	34	22	47
Columbus	128,153	98	9.18	8	11	6	...	...	...	...	...	1	1	...	...	1	...	2	...	24	1	20	46	3	2	...	2	4	7	4	...	9	4	4	8
Dayton	84,426	88	12.51	14	6	8	2	...	2	...	...	...	...	...	...	...	...	1	...	25	4	20	43	1	2	2	4	3	8	2	...	7	6	2	7
East Liverpool	17,595	19	12.39	7	2	3	1	...	...	...	...	...	...	...	...	...	...	1	...	6	1	5	4	...	...	...	1	...	1	...	...	2	...	...	...
Findlay	20,000	9	5.40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	3	1	2	5	...	1	...	...	1	...	...	...	1	...	1	...
Hamilton	22,771	16	8.43	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	6	1	5	5	...	...	...	...	...	2	...	...	...	...	2	2
Ironton	12,681	17	16.09	...	2	2	...	...	...	...	...	...	...	...	...	...	...	1	...	5	2	3	6	2	1	...	...	...	2	...	...	1	4	...	...
Lima	26,966	31	13.80	8	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	7	1	5	8	1	...	...	1	1	3	...	...	2	14	1	...
Mansfield	16,765	26	18.61	...	2	2	1	...	...	...	...	...	...	...	...	...	...	...	...	8	1	3	12	...	...	...	...	1	3	...	...	2	3	1	...
Massillon	13,255	17	15.38	...	...	6	1	...	...	...	...	...	...	...	...	...	...	...	...	3	...	3	5	...	...	...	1	...	1	...	...	2	3	...	...
Newark	18,833	16	10.19	...	...	2	2	...	...	...	...	...	...	...	...	...	...	...	...	2	...	2	9	...	...	1	...	1	1	...	...	6	3	...	3
Portsmouth	13,205	23	20.90	4	2	2	1	...	...	...	...	...	...	...	...	...	...	1	...	6	1	5	8	...	1	...	...	...	3	...	...	4	6	1	...
Sandusky	20 570	17	9.92	1	2	7	6	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	6	1	1	1	...	...	1	1	...	1	4	...	1
Springfield	43.121	30	8.35	3	2	3	3	...	...	...	...	...	...	...	...	...	...	...	...	3	1	2	13	3	2	...	...	1	4	...	...	2	10	1	5
Steubenville	14,386	8	6.67	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	2	6	...	...	1	1	...	2	...	...	1	...	...	...
Tiffin	13.469	22	19.61	3	...	2	...	...	...	...	...	...	...	...	1	...	...	...	...	3	...	3	9	1	...	...	...	...	3	...	...	5	1	3	1
Toledo	114,352	118	12 38	28	14	13	4	1	...	...	1	...	...	...	...	1	...	1	1	20	3	10	53	1	1	3	7	5	6	2	...	14	23	6	15
Youngstown	56,810	32	6.58	5	2	4	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	1	20	...	1	2	...	...	5	...	...	5	3	2	9
Zanesville	23,307	22	13.33	...	1	4	1	...	...	...	...	...	...	...	...	...	...	1	...	8	3	4	8	...	1	...	...	1	1	1	...	3	1	1	...
Totals	1,434,653	1,482	12.26	229	129	177	55	2	3	...	4	2	1	...	4	3	1	25	4	279	41	177	721	38	27	48	58	32	117	40	3	174	167	68	141

* No report received. Not included.

Abstract of the Reports of Deaths, and their Causes, in the Following Cities of Ohio, during the Month of February, 1897.

Cities of less than 10 000 inhabitants. (Census 1890.)	Population (estimated).	Total deaths, all causes.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total zymotic diseases.	Croup and diphtheria.	Cholera infantum.	Cerebro-spinal meningitis.	Cholera morbus.	Diarrhœal diseases.	Dysentery.	Malarial fevers.	Measles.	Puerperal fever.	Scarlet fever.	Tonsillitis.	Typhoid fever.	Whooping cough.	Total constitutional diseases.	Cancer.	Phthisis pulmonalis.	Total local diseases.	Apoplexia.	Bright's disease.	Bronchitis.	Convulsions.	Gastritis and peritonitis.	Heart disease.	Meningitis.	Pleurisy.	Pneumonia.	Total developmental diseases.	Total violence.	Premature and still births.
Alliance	10,758	5	5.58	1	2	2	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	...	...	1	1	...
Bellaire	11,534	9	9.36	1	2	2	...	...	...	...	...	...	...	...	...	...	...	1	1	3	...	3	4	...	...	...	...	...	1	...	...	3	...	...	...
Bucyrus	8,147	5	7.36	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	2	...	2	2	...	1	...	...	1	...	...	...	...	...	...	...
*Circleville	7,116	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
*Defiance	9 257	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Delaware	9,304	9	11.61	...	2	1	1	...	...	...	...	...	...	...	...	...	...	...	...	2	...	2	5	2	...	...	...	...	...	1	...	2	1	...	1
Fostoria	11,408	5	5.26	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	2	3	...	...	...	...	...	2	1	...	...	...	...	2
Fremont	6,343	5	9.46	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	2	1	...	...	...	...	...	...	...	...	1	2	...	...
Galion	6,859	7	12.25	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	5	...	...	...	...	...	1	1	...	1	...	1	...
Gallipolis	4,568	6	15.76	1	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	3	...	...	1	...	...	...	...	...	1	1	1	1
Greenville	7,478	2	3.21	...	...	1	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
*Kenton	7,091	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
*Lancaster	8,130	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Marietta	11,114	7	7.56	2	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	1	...	1	3	1	...	...	...	1	...	...	...	1	2	...	...
Marion	14,163	6	5 08	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	4	1	...	...	...	...	...	...	...	...	...	...	...	...	...	2
*Martin's Ferry	8,823	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Middletown	11,102	5	5.40	...	1	1	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	4	1	...	...	...	...	2	...	...	1	...	...	...
Mt. Vernon	6,639	3	5.42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	1	1	1
Norwalk	8,464	6	8.51	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4	1	3	2	1	...	...	...	...	1	...	...	...	...	...	...
Piqua	12,114	18	17.83	2	1	3	2	...	...	...	...	...	...	...	...	...	...	1	...	2	1	1	9	1	...	1	...	1	3	...	...	3	3	...	...
Pomeroy	4,219	4	11.38	...	1	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	1	...	...	...	...	...	1	...	...	1	...	...
Salem	7,425	2	3.23	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	...	...	1	...	...
*Troy	5,051	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Urbana	6,696	6	10 75	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	2	...	...	...	...	...	1	...	...	1	2	1	...
Warren	8 075	9	13.38	3	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	1	...	1	7	...	...	...	1	...	1	...	...	4	...	...	2
Washington C. H.	7,668	2	3.13	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...
Wellston	12,733	6	5.66	...	3	2	...	...	...	...	...	...	...	...	...	...	...	...	2	1	...	1	2	...	...	1	...	...	1	...	...	...	1	...	3
Wellsville	7,142	8	13.40	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	5	...	...	...	1	...	...	...	...	4	...	1	1
Wooster	5,914	9	18.17	1	...	3	...	...	...	...	...	1	...	...	...	...	...	...	1	1	...	1	5	1	3	...	...	...	...	...	...	1	...	...	...
Xenia	7,499	7	11.20	1	1	2	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	...	...	...	...	1	...	...	2	2	...	...
Totals	207.396	151	8.74	16	17	25	7	1	2	...	1	1	1	...	...	...	...	3	4	28	3	22	71	9	4	3	2	3	16	4	......	25	18	6	13

*No report reeeived. Not included.

Abstract of the Reports of Deaths, and their Causes, in the Following Cities of Ohio, during the Month of March, 1897.

Cities of 10,000 inhabitants (census 1890) or over.	Population (estimated).	Total deaths, all causes.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total zymotic diseases.	Croup and diphtheria.	Cholera infantum.	Cerebro-spinal meningitis.	Cholera morbus.	Diarrhœal diseases.	Dysentery.	Malarial fevers.	Measles.	Puerperal fever.	Scarlet fever.	Tonsillitis.	Typhoid fever.	Whooping cough.	Total constitutional diseases.	Cancer.	Phthisis pulmonalis.	Total local diseases.	Apoplexia.	Bright's disease.	Bronchitis.	Convulsions.	Gastritis and peritonitis.	Heart disease.	Meningitis.	Pleurisy.	Pneumonia.	Total developmental diseases.	Total violence.	Premature and still births.
*Akron	39,545	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Canton	44,556	25	6.73	4	...	4	1	...	...	...	...	...	...	...	...	...	...	3	...	6	2	4	8	...	...	...	1	...	4	1	...	2	7	...	...
Chillicothe	11,539	17	17.68	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	2	13	1	...	...	...	1	1	2	...	4	2	...	1
Cincinnati	344,293	483	16.83	69	42	43	10	...	...	...	2	1	...	2	3	4	...	5	1	115	13	78	162	5	6	24	10	19	30	28	1	73	23	15	56
Cleveland	373 600	417	13.39	94	37	61	10	2	...	...	1	1	...	1	1	2	...	7	2	85	22	28	196	12	3	20	51	10	16	12	...	43	36	10	36
Columbus	128,153	107	10.02	18	7	5	...	...	...	...	...	...	...	...	...	...	...	2	...	38	5	26	50	4	3	2	4	1	7	3	...	12	7	4	6
Dayton	84,426	74	10.52	11	3	3	2	...	...	...	...	...	...	...	...	...	...	...	...	26	6	17	33	2	...	...	1	3	7	1	...	5	5	2	...
East Liverpool	17,595	18	12.28	6	5	5	1	...	...	...	1	...	...	1	...	...	...	...	2	1	1	...	6	...	1	...	1	...	...	...	...	4	...	...	...
Findlay	20 000	16	9.60	6	1	1	...	...	...	...	...	...	1	...	...	...	...	...	...	1	...	1	11	...	...	...	...	...	1	...	...	2	1	2	...
Hamilton	22,771	26	13.70	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	2	4	2	1	15	...	2	...	...	...	4	...	...	2	...	...	...
Ironton	12,681	19	17.98	1	5	5	1	...	...	...	...	1	...	...	...	...	...	1	1	...	...	...	5	1	1	...	...	1	...	...	...	2	9	...	1
Lima	26 966	23	10.24	6	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5	1	4	7	...		...	...	1	2	...	...	4	8	3	2
Mansfield	16,765	19	13.54	2	2	5	2	...	...	...	...	...	...	...	...	...	...	1	...	6	...	6	7	2	...	...	...	...	1	...	...	...	1	...	1
Massillon	13.255	12	10.87	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	2	...	1	7	...	1	...	...	...	...	...	...	...	2	...	...
Newark	18 833	20	12.74	2	...	2	1	...	...	...	...	1	...	...	...	...	...	...	...	3	...	3	9	1	1	1	...	2	...	...	...	4	4	2	1
Portsmouth	13.205	30	27.26	6	4	...	...	...	...	...	...	...	...	...	...	...	...	...	.	3	...	3	22	...	...	2	3	...	3	1	...	9	4	1	2
Sandusky	20,570	21	12 25	...	2	5	3	...	...	...	...	...	...	...	...	...	...	...	...	3	...	3	3	...	...	...	...	...	1	...	...	2	9	1	4
Springfield	43.121	32	8.91	3	3	4	2	...	...	...	1	...	...	...	...	...	...	1	...	7	3	3	12	2	2	...	3	...	2	...	...	2	9	...	4
Steubenville	14,386	1	...	...	...	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Tiffin	13,469	14	12.47	1	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	10	2	...	...	...	...	2	...	...	...	...	...	...
Toledo	114 352	152	15.95	45	9	24	...	1	5	...	...	1	..	4	1	...	...	...	1	28	3	23	63	2	4	10	11	2	3	4	...	8	26	9	23
Youngstown	56,810	46	9.72	10	5	3	...	...	...	...	...	...	...	...	...	...	...	1	...	5	...	5	30	1	...	4	3	1	5	1	1	11	6	2	9
Zanesville	23,307	29	14.93	2	6	6	1	...	...	...	1	...	1	...	...	2	...	1	...	5	...	5	14	1	1	1	...	1	2	1	...	5	2	2	...
Totals	1,434,653	1,601	13.39	286	133	181	34	3	5	1	6	5	2	8	5	8	...	23	9	346	58	214	683	36	25	64	88	42	91	54	2	194	161	53	146

*No report received. Not included.

Abstract of the Reports of Deaths, and their Causes, in the Following Cities of Ohio, during the Month of March, 1897.

Cities of less than 10 000 inhabitants. (Census 1890.)	Population (estimated).	Total deaths, all causes.	Annual rate per 1.000.	Total under one year.	Total under five years and over one year.	Total zymotic diseases.	Croup and diphtheria.	Cholera infantum.	Cerebro-spinal meningitis.	Cholera morbus.	Diarrhœal diseases.	Dysentery.	Malarial fever.	Measles	Puerperal fever.	Scarlet fever.	Tonsillitis.	Typhoid fever.	Whooping cough.	Total constitutional diseases.	Cancer.	Phthisis pulmonalis.	Total local diseases.	Apoplexia.	Bright's disease.	Bronchitis.	Convulsions.	Gastritis and peritonitis.	Heart disease.	Meningitis.	Pleurisy.	Pneumonia.	Total developmental diseases.	Total violence.	Premature and still births.
Alliance	10,758	8	8.92	2	...	3	1	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...	1	3	...	...
Bellaire	11 534	16	16.65	1	5	1	...	...	...	...	1	...	...	...	...	...	...	...	...	3	...	2	12	1	2	1	...	1	2	...	1	4	...	...	2
Bueyrus	8,147	8	11.78	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	7	...	2	1	...	2	...	1	...	1	...	...	...
Circleville	7,116	12	20.23	...	...	3	1	...	...	...	...	...	...	...	...	...	...	1	...	2	...	2	7	2	...	1	...	...	3	...	1	...	...	...	...
*Defiance	9,257	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Delaware	9,301	6	7.74	1	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	3	...	...	...	...	...	1	...	...	2	2	...	1
Fostoria	11,408	3	3.16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	...	1	...	...	2	...	...	...	...	...	...
Fremont	6,313	6	11 35	...	1	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	4	3	...	...	...	...	...	...	...	1	1	...	...
Galion	6,859	2	3.50	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1	...	...	...
Gallipolis	4,568	10	26 27	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	2	5	...	...	...	...	1	1	...	...	2	2	...	...
Greenville	7,478	5	8.02	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	4	...	...	...	...	...	1	1	...	2	...	...	...
*Kenton	7 091	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
*Lancaster	8,130	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Marietta	11,114	6	6.48	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	...	...	...	...	1	1	...	1	3	...	2
Marion	14,163	11	9.31	...	...	3	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	4	...	...	...	...	...	...	...	...	1	3	1	2
*Martin's Ferry	8,823	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Middletown	11,102	9	9.73	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	2	6	1	...	1	...	...	1	3	...	...	...	1	...
Mt. Vernon	6,639	5	9.04	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	3	...	...	...	...	...	2	...	...	...	1	...	...
Norwalk	8,464	8	11.34	3	...	2	2	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	4	...	1	...	...	1	2	...	...	...	...	1	...
Piqua	12,114	10	9.90	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	5	1	...	...	1	...	...	...	...	...	1	2	...
Pomeroy	4,219	4	11.38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	...	...	...	...	3	...	...	...	1	...	...
Salem	7,425	8	12.93	...	...	2	...	...	...	...	...	...	...	...	2	...	...	...	...	2	...	2	4	1	...	...	1	1	1	...	...	...	...	...	...
Troy	5,051	3	7.13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	2	...	...	...	...	...	...	...	...	1	...	...	...
Urbana	6,696	8	14.34	...	1	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	5	...	1	...	1	...	2	...	...	1	2	...	1
*Warren	8,075	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Washington C. H.	7,668	6	9.39	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	1	3	...	...	...	...	...	...	1	...	2	...	1	1
Wellston	12,733	9	8.48	1	4	2	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	4	...	...	...	1	...	...	1	...	2	...	1	1
Wellsville	7,142	7	11.76	...	...	2	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	5	...	...	...	...	1	2	...	...	...	...	...	1
Wooster	5,944	6	12.11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	6	2	1	...	...	1	...	...	...	2	...	...	...
Xenia	7,499	15	24.1[illegible]	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	6	...	6	2	...	2	...	...	...	...	...	...	...	7	...	...
Totals	211,188	191	10.84	14	18	21	5	...	3	...	1	...	...	...	2	1	...	3	...	27	...	24	107	11	9	5	4	8	24	8	2	24	26	7	11

*No report received. Not included.

Abstract of the Reports of Deaths, and their Causes in the Following Cities of Ohio, during the Month of April, 1897.

Cities of 10,000 inhabitants (census 1890) or over.	Population (estimated).	Total deaths, all causes.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total zymotic diseases.	Croup and diphtheria.	Cholera infantum.	Cerebro-spinal meningitis.	Cholera morbus.	Diarrhœal diseases.	Dysentery.	Malarial fevers.	Measles.	Puerperal fever.	Scarlet fever.	Tonsillitis.	Typhoid fever.	Whooping cough.	Total constitutional diseases.	Cancer.	Phthisis pulmonalis.	Total local diseases.	Apoplexia.	Bright's disease.	Bronchitis.	Convulsions.	Gastritis and peritonitis.	Heart disease.	Meningitis.	Pleurisy.	Pneumonia.	Total developmental diseases.	Total violence.	Premature and still births.
*Akron	39,545	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Canton	44.556	15	4.04	3	2	3	1	...	...	...	...	...	...	...	...	...	...	2	...	3	...	3	7	...	...	...	1	...	3	3	...	...	2	...	...
Chillicothe	11,539	21	21.84	...	...	2	...	...	...	...	...	1	...	...	...	...	...	1	...	3	...	2	10	...	1	...	...	...	...	1	...	3	1	...	3
Cincinnati	344,293	456	15.89	73	45	45	8	...	...	...	...	...	...	3	...	1	...	5	3	119	22	71	244	11	8	28	10	18	24	12	1	63	25	23	56
Cleveland	373,600	404	12.98	110	32	39	7	4	4	...	1	...	...	...	...	...	1	9	1	61	10	20	221	7	5	8	50	8	27	18	1	42	65	18	51
Columbus	128,153	122	11.42	16	7	10	1	...	...	...	1	...	1	...	...	...	...	3	...	34	11	17	53	2	1	1	...	3	17	3	...	12	17	7	9
Dayton	84,426	78	11.09	16	4	10	3	...	5	...	...	...	...	...	...	1	...	...	2	23	4	17	27	2	...	...	2	1	5	2	...	5	7	3	5
East Liverpool	17 595	18	12.28	2	...	2	...	...	...	...	...	...	...	2	...	...	...	...	...	2	...	2	10	...	...	...	1	...	3	1	...	5	...	...	...
Findlay	20,000	9	5.40	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	2	5	...	...	1	...	...	1	...	...	1	3	2	...
Hamilton	22,771	26	13.70	...	...	2	1	...	...	...	...	...	...	...	...	...	...	...	1	9	1	6	11	...	1	...	...	...	1	...	...	3	...	1	...
Ironton	12,681	20	18.93	4	4	7	1	...	...	...	...	...	...	...	...	...	...	6	...	4	1	3	4	...	...	...	1	2	...	...	...	1	...	1	1
Lima	26 966	25	11.13	4	2	3	...	...	...	...		...	...	...	...	...	...	...	1	3	...	3	8	...	1	...	1	...	3	1	...	2	8	3	2
Mansfield	16,765	15	10.73	1	...	2	...	...	1	...	...	...	...	...	...	...	...	...	...	2	...	2	10	...	...	1	...	...	3	...	...	...	1	...	2
Massillon	13,255	17	15.39	...	...	2	1	...	...	...	...	...	...	...	...	...	...	...	1	2	...	1	10	...	...	1	1	2	...	1	...	...	1	1	...
Newark	18 833	17	18.32	2	2	1	...	...	1	...	...	...	...	...	...	...	...	...	...	5	2	2	8	1	4	...	...	1	...	1	...	1	2	1	3
Portsmouth	13,205	17	15.45	2	3	1	...	...	...	...	...	...	...	...	...	...	...	1	...	3	...	2	11	1	...	1	...	1	3	1	...	4	1	1	1
Sandusky	20,570	19	11.09	3	3	7	4	1	...	...	...	...	...	1	...	...	...	...	...	2	...	2	6	...	...	...	...	...	1	...	...	2	3	1	2
Springfield	43,121	29	8.08	4	2	4	1	...	1	...	...	...	...	...	...	1	...	...	...	7	2	5	14	...	2	1	2	...	5	...	...	2	3	1	3
Steubenville	14,386	2	...	...	1	1	...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...
Tiffin	13,469	8	7.13	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	2	3	...	...	...	...	...	1	...	...	2	1	1	...
Toledo	114,352	118	12.39	25	12	13	2	...	1	...	...	...	...	2	1	1	...	...	...	24	6	14	58	2	2	6	9	...	7	2	...	9	15	8	15
Youngstown	56,810	36	7.39	6	1	2	...	...	...	...	...	...	...	...	...	...	...	1	...	6	...	5	25	1	...	2	...	...	2	2	...	7	2	...	4
Zanesville	23,307	31	11.67	2	4	2	...	...	1	...	...	...	...	...	...	...	...	...	...	6	...	5	14	2	...	...	...	1	...	2	...	4	4	...	4
Totals	1,434,653	1,502	12.56	274	124	159	30	5	14	...	2	1	1	9	1	4	1	28	9	323	59	187	759	29	25	50	78	37	106	50	2	168	161	72	161

*No report received. Not included.

Abstract of the Reports of Deaths, and their Causes in the Following Cities of Ohio, During the Month of April, 1897.

Cities of less than 10,000 inhabitants. (Census 1890.)	Population estimated).	Total deaths, all causes.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total zymotic diseases.	Croup and diphtheria.	Cholera infantum.	Cerebro-spinal meningitis.	Cholera morbus.	Diarrheal diseases.	Dysentery.	Malarial fevers.	Measles.	Puerperal fever.	Scarlet fever.	Tonsillitis	Typhoid fever.	Whooping cough.	Total constitutional diseases.	Cancer.	Phthisis pulmonalis.	Total local diseases.	Apoplexia.	Bright's disease.	Bronchitis.	Convulsions.	Gastritis and peritonetis.	Heart disease.	Meningitis.	Pleurisy.	Pneumonia.	Total developmental diseases.	Total violence.	Premature and still births.
Alliance	10,758	6	6.69	...	2	1	1	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	4	...	...	...	...	3	...	...	...	...	...	...	...
Bellaire	11,534	10	10.40	2	2	2	...	...	...	...	...	1	...	...	...	...	...	...	...	4	2	1	4	...	...	...	...	...	...	1	...	2	...	...	1
Bucyrus	8,147	8	11.78	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	7	1	1	...	...	...	4	...	...	1	...	1	...
Circleville	7,116	11	18 55	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	4	...	4	5	1	...	...	...	2	2	...	...	...	...	...	...
*Defiance	9,257	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Delaware	9,301	9	11.61	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4	2	2	4	...	...	...	...	1	2	...	...	1	1	...	1
Fostoria	11,408	2	2.10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	1	...	...	1	...	...	...	...	...	1
Fremont	6,343	6	11.35	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	2	1	...	...	...	...	...	...	...	1	2	...	1
Galion	6,859	7	12.25	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	3	1	2	2	...	...	...	...	...	2	...	...	...	...	...	...
Gallipolis	4,568	4	10.51	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	1	...	...	...	...	...	...	...	...	...	1	...	...
Greenville	7,478	3	4.80	...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	1	...	1	1	...	...	...	...	...	1	...	...	...	...	...	...
*Kenton	7,091	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
*Lancaster	8,130	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Marietta	11,114	14	15.11	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	12	1	3	1	...	1	2	...	1	3	1	...	1
Marion	14 163	2	1.70	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	1	...	...	...	...	...	...	...	...	...	...
*Martin's Ferry	8.823	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Middletown	11,102	9	9.73	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	1	1	6	...	1	...	...	1	1	1	...	3	...	...	...
Mt. Vernon	6,639	7	12.65	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	5	2	...	...	...	...	2	...	...	1	...	...	1
Norwalk	8.464	6	8.51	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	3	...	...	...	...	...	1	...	...	2	...	1	1
Piqua	12,114	19	18.82	...	1	2	2	...	...	...	...	...	...	...	...	...	...	...	...	4	1	3	9	...	...	...	...	1	2	1	...	1	2	2	...
*Pomeroy	4,219	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Salem	7,425	8	12.93	...	...	1	...	...	...	...	...	...	...	...	...	1	...	...	...	2	1	1	3	...	...	...	...	...	...	...	...	...	...	1	...
Troy	5,051	6	14.26	...	1	1	...	...	...	...	1	...	...	...	...	...	...	...	...	1	...	1	4	...	...	...	1	...	...	...	...	...	...	...	1
Urbana	6,696	6	10.75	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	2	2	...	...	...	...	1	...	...	...	...	2	...	1
Warren	8,075	11	16.35	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	10	...	...	...	...	...	...	1	...	6	...	...	1
Washington C. H.	7,668	7	10.95	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	3	3	...	1	1	...	...	...	...	...	...	...	1	1
Wellston	12.733	7	6.60	1	3	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4	...	...	...	1	1	1	...	...	...	2	...	1
Wellsville	7,142	13	21.84	...	...	3	...	...	3	...	...	...	...	...	...	...	...	...	...	2	2	...	3	...	...	...	...	...	1	2	...	...	4	1	2
Wooster	5,944	11	22.21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	10	3	3	...	...	1	...	...	...	3	...	...	...
Xenia	7,499	10	16.02	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	6	1	...	...	...	...	3	...	...	2	...	...	...
Totals	215,344	202	11.26	6	13	19	5	...	4	...	1	1	...	...	...	1	...	1	...	41	11	27	114	10	10	3	2	12	25	6	1	26	15	7	14

*No report received. Not included.

Abstract of the Reports of Deaths, and their Causes, in the Following Cities of Ohio, during the Month of May, 1897.

Cities of 10,000 inhabitants (census 1890) or over.	Population (estimated).	Total deaths, all causes.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total zymotic diseases.	Croup and diphtheria.	Cholera infantum.	Cerebro-spinal meningitis.	Cholera morbus.	Diarrheal diseases.	Dysentery	Malarial fevers.	Measles.	Puerperal fever.	Scarlet fever.	Tonsillitis	Typhoid fever.	Whooping cough.	Total constitutional diseases.	Cancer.	Phthisis pulmonalis.	Total local diseases.	Apoplexia.	Bright's disease.	Bronchitis.	Convulsions.	Gastritis and peritonitis.	Heart disease.	Meningitis.	Pleurisy.	Pneumonia.	Total developmental diseases.	Total violence.	Premature and still births.
*Akron	39,545	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Canton	44,556	22	5.90	1	1	2	...	...	...	...	1	...	...	...	...	...	..	1	...	6	1	4	7	...	2	...	1	...	2	1	...	1	7	...	...
Chillicothe	11,539	19	19.76	...	...	2	2	...	...	...	...	...	...	...	...	...	...	...	...	5	...	2	8	1	...	...	2	...	4	...	...	...	4	...	1
Cincinnati	344,293	399	13.91	65	51	52	14	2	...	1	3	1	...	3	...	1	...	10	2	78	18	46	214	11	4	16	10	11	25	20	...	37	28	27	40
Cleveland	373,600	376	12.08	93	34	47	11	6	...	2	2	...	...	1	...	...	1	6	4	66	10	28	175	5	5	6	24	11	24	21	1	40	29	17	34
Columbus	128,153	79	7.39	13	3	4	...	...	..	...	...	1	...	...	...	...	...	...	...	24	4	17	31	1	2	...	2	6	10	2	...	5	3	10	2
Dayton	84,426	93	13.22	8	9	7	3	1	...	...	...	...	1	...	...	...	...	...	...	21	6	15	56	...	2	1	...	1	15	4	...	8	5	4	9
East Liverpool	17.595	21	14.32	2	7	6	1	...	...	...	...	2	...	...	...	...	...	3	...	3	...	3	8	...	...	...	...	...	3	...	...	5	1	...	...
Findlay	20,000	16	9.60	1	1	2	...	...	...	...	...	1	1	...	...	...	.	...	..	4	1	3	7	1	2	...	...	...	1	...	...	...	1	2	...
Hamilton	22,771	28	14.75	...	...	1	...	...	...	..	...	...	...	...	...	...	...	...	...	7	3	...	11	...	...	...	...	...	4	...	...	2	1	...	...
Ironton	12,681	17	16.09	2	2	1	...	...	...	...	...	1	...	...	...	...	...	...	...	3	1	2	5	...	...	...	1	1	1	...	...	2	6	2	2
Lima	26,966	21	9.35	1	2	1	...	1	...	...	..	...	...	...	...	...	...	...	...	5	...	5	6	1	...	...	...	...	4	1	...	...	8	1	...
Mansfield	16,765	17	12.17	1	2	2	2	...	...	...	...	...	...	...	...	...	...	...	...	5	1	4	6	2	...	...	...	...	3	...	...	...	2	1	3
Massillon	13 255	10	9.05	...	...	3	1	...	...	...	...	...	...	...	...	...	...	1	...	1	...	1	5	1	...	...	1	1	1	...	...	...	1	...	...
Newark	18,833	19	12.11	2	1	1	...	.	...	...	...	...	...	...	...	...	...	...	...	6	3	3	5	...	...	...	...	...	3	...	...	2	5	2	1
Portsmouth	13 205	22	20.00	2	2	5	1	1	...	...	...	...	...	...	...	...	...	3	...	3	...	3	10	...	1	...	...	...	3	2	...	4	4	...	2
Sandusky	20,570	9	4.12	...	...	2	...	...	...	...	...	...	...	...	1	...	...	1	...	1	...	1	3	1	...	...	...	...	1	...	...	...	3	...	...
Springfield	43,121	25	6.96	2	3	1	...	...	...	...	...	...	...	...	...	...	...	...	1	4	2	2	13	...	3	1	1	1	5	...	...	...	3	4	4
Stubenville	14,386	1	...	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1	...	...	...
Tiffin	13,469	14	12.47	...	...	1	...	...	...	...	...	1	...	...	...	...	...	...	...	2	...	2	10	...	...	1	2	...	5	...	...	2	1	...	...
Toledo	114.352	125	13.12	30	10	16	...	...	1	...	2	...	2	...	...	...	...	4	...	20	5	14	52	1	...	6	7	2	7	2	...	7	29	8	21
Youngstown	56.810	33	6.97	5	7	5	...	...	...	...	...	...	2	...	...	...	...	...	...	2	1	...	22	...	...	1	4	3	1	1	...	6	4	...	5
Zanesville	23,307	16	8.24	1	2	3	...	...	...	...	...	...	...	...	...	...	...	3	...	3	1	2	7	1	1	...	...	...	...	1	..	3	2	1	...
Totals	1,434,653	1,382	11.56	229	137	164	35	11	1	3	8	7	6	4	1	1	1	32	7	269	57	157	662	26	22	32	55	37	122	55	1	125	147	79	124

*No report received. Not included.

Abstract of the Reports of Deaths, and their Causes, in the Following Cities of Ohio, during the Month of May, 1897.

Cities of less than 10,000 inhabitants. (census 1899.)	Population (estimated.)	Total deaths, all causes.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total zymotic diseases.	Croup and diphtheria.	Cholera infantum.	Cerebro-spinal meningitis.	Cholera morbus.	Diarrhœal diseases.	Dysentery.	Malarial fevers.	Measles.	Puerperal fever.	Scarlet fever.	Tonsillitis.	Typhoid fever.	Whooping cough.	Total constitutional diseases.	Cancer.	Phthisis pulmonalis.	Total local diseases.	Apoplexia.	Bright's disease.	Bronchitis.	Convulsions.	Gastritis and peritonitis.	Heart disease.	Meningitis.	Pleurisy.	Pneumonia.	Total developmental diseases.	Total violence.	Premature and still births.
Alliance	10,758	7	7.80	1	......	......	......	......	......	......	......	...	...	...	...	...	...	......	......	1	......	1	5	......	......	......	1	......	3	......	......	......	1	......	......
Bellaire	11,534	10	10.40	3	2	2	......	......	......	......	......	1	...	...	...	...	...	......	......	1	......	1	7	......	1	......	1	......	1	1	......	3	......	......	1
Bucyrus	8,147	5	7.36	......	......	1	......	......	......	......	......	...	...	...	...	...	...	......	......	......	......	......	4	......	1	......	......	......	3	......	......	......	......	......	......
Circleville	7,116	5	8.43	......	1	......	......	......	......	......	......	...	...	...	...	...	...	......	......	3	......	......	2	......	......	......	......	......	......	......	......	......	......	......	1
*Defiance	9,257	......	....	......	......	......	......	......	......	......	......	...	...	...	...	...	...	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Delaware	9,304	4	5 16	......	......	......	......	......	......	......	......	...	...	...	...	...	...	......	......	2	......	2	1	......	......	......	......	......	1	......	......	......	......	1	......
Fostoria	11,408	3	3.16	......	......	1	......	......	......	......	......	...	...	...	...	...	...	......	......	......	......	......	2	......	2	......	......	......	......	......	......	......	......	......	......
Fremont	6,343	5	9.46	1	4	1	......	......	......	......	......	...	...	1	...	...	...	......	......	......	......	......	3	1	......	......	......	......	1	......	......	1	1	......	......
Galion	6,859	6	10.49	......	......	1	......	......	1	......	......	...	...	...	...	...	...	......	......	1	......	1	2	1	......	......	......	......	1	......	......	......	......	2	......
Gallipolis	4,568	11	28.89	......	......	......	......	......	......	......	......	...	...	...	...	...	...	......	......	5	......	5	4	1	......	......	1	......	2	......	......	......	1	1	1
Greenville	7,478	4	6.42	1	......	......	......	......	......	......	......	...	...	...	...	...	...	......	......	......	......	......	4	......	......	......	1	1	1	1	......	......	......	......	1
*Kenton	7,091	......	....	......	......	......	......	......	......	......	......	...	...	...	...	...	...	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Lancaster	8,130	7	10.33	......	......	......	......	......	......	......	......	...	...	...	...	...	...	......	......	3	2	1	4	......	2	......	......	......	1	......	......	1	......	......	2
Marietta	11,114	5	5.40	......	......	2	......	......	1	......	......	...	...	...	...	...	...	1	......	......	......	......	......	......	......	......	......	......	......	......	......	......	3	......	......
Marion	14,163	5	4.24	......	......	1	......	......	......	......	......	...	...	...	...	...	...	......	......	......	......	......	4	......	......	......	......	......	......	......	......	......	......	......	......
*Martin's Ferry ...	8,823	......	....	......	......	......	......	......	......	......	......	...	...	...	...	...	...	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Middletown	11,102	7	7.57	1	......	......	......	......	......	......	......	...	...	...	...	...	...	......	......	3	......	2	4	1	1	......	......	1	......	1	......	......	......	......	......
Mt. Vernon	6,639	5	9.01	......	..	......	......	......	......	......	......	...	...	...	...	...	...	......	......	1	......	1	4	1	......	......	......	......	2	......	......	1	......	......	......
Norwalk	8,464	3	4.24	......	......	1	1	......	......	......	......	...	...	...	...	...	...	......	......	......	......	......	2	......	1	......	......	......	......	......	......	1	......	......	3
Piqua	12,114	11	10.89	2	......	1	1	......	......	......	......	...	...	...	...	...	...	......	......	3	......	3	4	......	......	......	......	......	......	2	......	1	1	2	......
*Pomeroy	4,219	......	....	......	......	......	......	......	......	......	......	...	...	...	...	...	...	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Salem	7,425	7	11.31	......	......	1	......	......	......	......	......	...	...	...	...	...	...	......	......	2	1	1	4	......	1	......	......	......	2	......	......	......	......	......	......
*Troy	5,051	......	....	......	......	......	......	......	......	......	......	...	...	...	...	...	...	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Urbana	6,696	4	7.17	1	1	......	......	......	......	......	......	...	...	...	...	...	...	......	......	1	1	......	2	......	......	......	......	......	1	......	......	1	1	......	......
Warren	8,075	8	10.65	1	2	......	......	......	......	......	......	...	...	...	...	...	...	......	......	1	......	1	6	2	......	......	......	......	1	......	......	3	1	......	......
Washington C. H.	7,668	9	14.08	1	......	......	......	......	......	......	......	...	...	...	...	...	...	......	......	6	......	6	2	1	......	......	......	......	......	......	......	......	......	......	1
Wellston	12,733	4	3.80	......	......	1	1	......	......	......	......	...	...	...	...	...	...	......	......	2	......	2	1	......	......	......	......	......	......	......	......	1	......	......	2
Wellsville	7,142	11	18.48	......	......	1	......	......	......	......	......	...	...	...	...	...	...	......	......	4	......	1	4	1	......	......	......	......	......	......	......	2	......	......	2
Wooster	5,944	8	16.15	......	......	......	......	......	......	......	......	...	...	...	...	...	...	......	......	......	......	......	8	1	3	......	......	......	1	......	......	......	......	......	......
Xenia	7,499	16	25.60	1	3	......	......	......	......	......	......	...	...	...	...	...	...	......	......	4	1	3	8	......	1	......	1	2	2	1	......	1	......	......	......
Totals	218,423	170	9.34	13	13	14	3	......	2	......	.. ...	1	...	1	...	...	...	1	......	43	5	31	91	10	13	......	5	4	23	6	......	16	9	6	14

*No report received.

Abstract of the Reports of Deaths, and their Causes, in the Following Cities of Ohio, during the Month of June, 1897.

Cities of 10,000 inhabitants (census 1890) or over.	Population (estimated).	Total deaths, all causes.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total zymotic diseases.	Croup and diphtheria.	Cholera infantum.	Cerebro-spinal-meningitis.	Cholera morbus.	Diarrhœal diseases.	Dysentery.	Malarial fevers.	Measles.	Puerperal fever.	Scarlet fever.	Tonsilitis.	Typhoid fever.	Whooping cough.	Total constitutional diseases.	Cancer.	Phthisis pulmonalis.	Total local diseases.	Appoplexia.	Bright's disease.	Bronchitis.	Convulsions.	Gastritis and peritonitis.	Heart disease.	Meningitis.	Pleurisy.	Pneumonia.	Total developmental diseases.	Total violence.	Premature and still births.
Akron	39,545	26	7.89	1	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	3	1	1	18	6	3	...	...	2	2	2	...	2	1	2	8
Canton	44,556	12	3.23	3	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	2	...	2	4	1	1	...	...	...	1	...	...	1	4	1	...
Chillicothe	11,539	15	15.59	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	1	6	...	...	...	1	...	1	...	...	1	4	...	...
Cincinnati	344,293	396	13.80	82	29	56	6	8	3	1	3	2	...	5	2	1	...	3	3	75	15	46	187	12	8	15	4	14	22	17	...	23	40	38	48
Cleveland	373,600	339	10.89	73	25	41	5	6	3	1	2	...	...	...	...	1	...	3	...	65	11	17	150	6	2	3	32	13	27	19	2	20	53	26	34
Columbus	128,153	102	9 55	15	7	7	...	4	...	...	...	...	...	...	...	1	...	1	...	29	10	12	39	3	...	...	...	5	8	8	...	5	13	10	4
Dayton	84,426	88	12.50	4	3	5	...	2	...	...	...	...	...	...	...	...	...	...	...	17	4	13	49	2	2	...	2	2	10	2	...	4	12	6	9
East Liverpool	17,595	5	3.41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	3	...	...	...		...	1	...	...	...	...	...	...
Findlay	20,000	13	7.80	1	...	...	...	...	...	...	...	...	...	...	...	...	...		...	3	1	2	8	...	1	...	...	...	3	..	...	...	1	...	...
Hamilton	22,771	22	11.60	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	7	4	3	12	...	...	...	...	...	7	1	...	...	2	1	3
Ironton	12,681	17	16.09	3	...	3	...	...	...	...	...	2	...	...	...	...	...	1	...	2	...	2	4	...	...	...	...	1	1	2	...	...	7	1	...
Lima	26,966	25	11 13	4	1	5	1	2	...	...	...	...	1	...	...	...	...	...	...	5	2	3	8	...	1	...	1	...	5	...	...	1	6	1	5
Mansfield	16,765	9	6.44	1	1	2	1	...	1	...	...	...	...	...	...	...	...	...	...	1	1	...	4	...	...	...	...	...	2	...	...	...	1	1	...
Massillon	13,255	6	5.43	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	3	1	1	2	...	...	...	...	...	2	...	...	...	...	...	...
Newark	18,833	10	6.32	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5	...	5	5	...	1	...	...	2	1	1	...	...	...	...	2
Portsmouth	13,205	22	20.00	4	2	2	...	...	...	...	1	...	...	...	...	...	...	1	...	3	...	3	8	...	1	...	...	3	1	...	...	...	6	3	1
Sandusky	20,570	22	12.84	3	1	4	1	...	...	...	...	...	...	...	1	...	...	2	...	3	3	...	6	...	...	...	1	...	4	...	...	1	7	2	3
Springfield	43,121	30	8.35	2	5	5	...	1	1	...	...	2	...	...	...	...	...	...	...	5	1	4	18	4	...	...	...	4	5	3	...	...	...	2	2
*Steubenville	14 386	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Tiffin	13,469	10	8.99	...	...	2	...	...	1	...	...	...	...	...	...	...	...	1	...	2	...	2	6	2	1	...	...	2	1	...	...	...	...	...	...
Toledo	114,352	100	10.49	18	3	9	2	...	...	...	1	...	...	...	...	1	...	1	...	19	5	12	39	...	1	1	6	1	9	...	...	4	16	17	24
Youngstown	56,810	32	6.76	7	5	6	1	...	...	...	...	...	...	2	...	...	...	2	...	5	1	4	15	...	1	1	3	1	...	1	...	4	3	3	9
Zanesville	23,307	21	10.81	1	4	1	...	1	...	...	...	...	...	...	...	...	...	...	...	4	1	3	9	...	2	...	...	...	1	...	...	2	2	5	...
Totals	1,459,812	1,322	10.87	226	87	153	17	25	9	2	7	6	1	7	3	4	...	15	3	262	62	136	600	36	25	20	50	50	114	56	2	68	178	119	152

* No report received. Not included.

Abstract of the Reports of Deaths, and their Causes, in the Following Cities of Ohio, During the Month of June, 1897.

Cities of less than 10,000 inhabitants. (Census 1895.	Population (estimated.)	Total deaths, all causes.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total zymotic diseases.	Croup and diphtheria.	Cholera infantum.	Cerebro-spinal meningitis.	Cholera morbus.	Diarrhœal diseases.	Dysentery.	Malarial fevers.	Measles.	Puerperal fever.	Scarlet fever.	Tonsillitis.	Typhoid fever.	Whooping cough.	Total constitutional diseases.	Cancer.	Phthisis pulmonalis.	Total local diseases.	Apoplexia.	Bright's disease.	Bronchitis.	Convulsions.	Gastritis and peritonitis.	Heart disease.	Meningitis.	Pleurisy.	Pneumonia.	Total developmental diseases.	Total violence.	Premature and still births.
Alliance	10 758	7	7.80		1	1										1				4	1	3	1										1		1
Bellaire	11.534	7	7 28	2																2		2	4				2					1		1	
Bucyrus	8,147	5	7.36			1									1								4	2	2										1
Circleville	7,116	9	15.18	1	1															3			6												1
*Defiance	9,257																																		
Delaware	9,304	4	5.16																				3						2			1	1		
Fostoria	11,408	5	5.26	1																2		2	3						1	1		1			
Fremont	6,343	6	11.35																	1		1	4	1				1				1		1	
Gahon	6,859	3	5.25			1											1						1						1					1	
Gallipolis	4,568	11	28.89			2			1									1					6						3			2	3		
Greenville	7,478	4	6.42		1																		4		2				1	1					1
*Kenton	7,091																																		
Lancaster	8,130	14	20.66	5		3		2					1							4	1	3	4	1				2		1			3		3
Marietta	11,114	5	5.40	2		2		1															1		1								2		
Marion	14,163	4	3.40	1		2	1		1											1														1	
*Martin's Ferry	8,823																																		
Middletown	11,102	11	11.90	1		1					1									4	1	3	5	2	1	1				1				1	
Mt. Vernon	6,639	5	9.04																	1			2						1			1	1	1	
Norwalk	8,464	6	8.48																	3	2	1	2		2									1	
Piqua	12,114	12	11.90	2																5		4	5							2			2		
*Pomeroy	4,219																																		
Salem	7,425	7	11 31			1														2	1	1	4						2						
*Troy	5,051																																		
Urbana	6,696	11	19.71	2		3					1					1				3		2	3					1	2					2	1
Warren	8,075	1	1.49																	1		1													
Washington C. H.	7,668	5	7.82	3		1							1							2		2	1						1					1	1
Wellston	12,733	11	10.37	4		7		1	2		2	1						1		1		1	3	1				1	1						2
Wellsville	7,142	7	11.76			2	1													3		3	1				1								1
Wooster	5,944	4	8.08																	2		2	2	2											
Xenia	7,499	10	16.02	1																2	1	1	2					1	1					6	
Totals	218,423	174	9.56	25	3	27	2	4	4	...	4	1	2	...	1	2	1	2	...	46	7	32	71	9	8	1	3	6	16	6	...	7	13	16	12

*No report received. Not included.

Abstract of the Reports of Deaths, and their Causes, in the Following Cities of Ohio, during the Month of July, 1897.

Cities of 10,000 inhabitants (census 1890) or over.	Population (estimated.)	Total deaths, all causes.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total zymotic diseases.	Croup and diphtheria.	Cholera infantum.	Cerebro-spinal meningitis.	Cholera morbus.	Diarrhœal diseases.	Dysentery.	Malarial fevers.	Measles.	Puerperal fever.	Scarlet fever.	Tonsilitis.	Typhoid fever.	Whooping cough.	Total constitutionall diseases.	Cancer.	Phthisis pulmonalis.	Total local diseases.	Appoplexia.	Bright's disease.	Bronchitis.	Convulsions.	Gastritis and peritonitis.	Heart disease.	Meningitis	Pleurisy.	Pneumonia.	Total developmental diseases.	Total violence.	Premature and still births.
Akron	39,545	52	15.78	20	4	16	1	12	......	...	...	...	1	...	...	...	...	...	...	5	2	3	19	5	2	......	......	......	4	2	1	1	6	3	4
Canton	44,556	28	7.54	8	3	7	......	7	......	...	...	...	...	...	...	...	...	...	...	4	1	2	5	......	2	......	2	......	......	1	...	......	12	......	.....
Chillicothe	11,539	27	28.08	......	......	6	......	4	......	...	...	...	...	...	...	...	...	1	...	4	1	3	8	......	......	......	......	......	1	1	...	......	6	3	2
Cincinnati	344,293	565	19.69	155	62	113	5	25	3	2	13	3	...	2	1	1	...	17	8	78	7	46	300	17	7	8	17	14	25	28	..	11	44	30	38
Cleveland	373,600	602	19.34	279	81	219	7	147	3	3	4	8	2	8	...	1	...	7	5	58	20	15	191	9	2	7	54	23	16	23	...	20	86	31	36
Columbus	128,153	115	10.77	30	11	28	1	21	......	...	...	...	1	...	...	...	...	1	...	18	4	12	46	5	3	1	......	5	1	12	...	3	12	9	7
Dayton	84,426	106	15 07	29	10	14	......	6	2	...	...	...	...	...	...	...	...	1	2	23	7	13	35	5	1	......	5	1	10	4	...	3	11	13	8
East Liverpool	17.595	8	5.46	.....	......	1	1	....	......	...	...	...	...	...	...	...	...	...	...	1	.....	1	3	.....	......	......	......	......	......	......	..	......	.....	1	......
Findlay	20,000	16	9 60	2	2	5	.....	3	......	...	...	...	1	...	...	...	...	1	...	3	1	2	6	......	......	......	1	......	2	1	...	......	1	1	......
Hamilton	22,771	29	15.24	9	......	11	......	6	......	1	...	...	...	...	...	...	...	1	2	4	2	1	11	1	......	......	1	......	3	......	...	......	2	1	......
Ironton	12,681	14	13.25	1	1	3	1	......	......	...	1	...	...	...	...	...	...	1	...	3	3	......	3	......	......	......	......	1	1	1	...	......	5	.....	......
Lima	26 966	13	5.78	2	3	4	......	3	......	...	...	1	...	...	...	...	...	...	...	3	......	3	2	......	......	......	....	......	2	......	...	......	2	2	1
Mansfield	16.765	11	7.88	5	......	4	......	2	......	...	...	...	...	...	...	...	...	...	...	......	......	......	7	......	......	......	2	......	2	......	1	1	......	......	1
Massillon	13,255	8	7.24	......	......	2	......	1	......	...	..	...	...	...	...	...	...	...	...	2	......	1	4	......	......	......	1	......	1	......	...	......	......	......	......
Newark	18,833	19	12.11	4	1	3	1	1	......	...	...	...	...	..	...	...	1	...	...	4	1	2	7	....	2	......	.....	1	2	2	...	......	2	3	5
Portsmouth	13,205	24	21.81	7	3	6	......	3	......	1	2	...	...	...	...	...	...	...	...	1	......	1	5	1	......	......	......	1	3	......	...	......	11	1	1
Sandusky	20,570	15	8.75	2	1	5	1	2	......	...	...	...	...	...	...	...	...	2	...	3	......	3	3	......	......	......	1	......	1	1	...	......	4	......	1
Springfield	43,121	46	12.80	10	11	14	......	7	1	...	1	..	...	...	...	1	...	1	2	5	......	5	15	2	2	......	1	2	3	2	...	......	9	3	2
*Steubenville	14,386	....	....	......	......	......	......	......	......	...	...	...	...	...	...	...	...	...	...	......	......	......	......	......	......	......	......	......	......	......	...	......	......	......	......
Tiffin	13,469	15	13.37	1	.....	1	......	......	......	...	...	...	...	...	...	...	...	...	...	2	1	1	5	1	......	......	......	1	2	......	...	......	4	......	2
Toledo	114,352	145	15.22	39	12	27	2	14	2	2	1	1	...	...	...	...	...	2	...	9	1	8	66	1	6	......	11	4	6	2	...	5	21	21	16
Youngstown	56,810	57	12.04	18	8	19	.....	15	......	1	...	...	1	2	...	..	..	...	...	6	1	3	21	1	......	2	3	1	1	3	...	2	6	1	10
Zanesville	23,307	50	25.75	20	5	24	......	17	......	...	1	3	1	...	...	...	...	1	...	2	1	1	13	1	1	......	......	2	2	......	...	1	9	2	2
Totals	1,459,812	1,965	16.15	641	218	532	20	296	11	10	23	16	7	12	1	3	1	36	19	238	53	126	775	49	28	18	99	56	88	83	2	47	253	125	136

*No report received. Not included.

Abstracts of the Reports of Deaths, and their Causes, in the Following Cities of Ohio, during the Month of July, 1897.

Cities of less than 10,000 inhabitants. (census 1890)	Population (estimated).	Total deaths, all causes.	Annual rate per 1.000.	Total under one year.	Total under five years and over one year.	Total zymotic diseases.	Croup and diphtheria.	Cholera infantum.	Cerebro-spinal meningitis.	Cholera morbus.	Diarrhœal diseases	Dysentery.	Malarial fevers.	Measles.	Puerperal fever.	Scarlet fever.	Tonsillitis.	Typhoid fever.	Whooping cough.	Total constitutional diseases.	Cancer.	Phthisis pulmonalis.	Total local diseases.	Apoplexia.	Bright's disease.	Bronchitis.	Convulsions.	Gastritis and peritonitis.	Heart disease.	Meningitis.	Pleurisy.	Pneumonia.	Total developmental diseases.	Total violence.	Premature and still births.
Alliance	10,758	7	7.80	4	1	1		1															4						1				1	1	
Bellaire	11,531	8	8.33	4	1	3			2		1									2	2		3					1		2					1
Bucyrus	8,147	8	11.78																	2		2	1						1					4	
Circleville	7.116	10	16.86	6		3																	6											1	1
*Defiance	9,257																																		
Delaware	9,301	9	11.61	3	2															2		2	2		1					1			4	1	
Fostoria	11,408	4	4.20																	4		4													2
Fremont	6,343	1	1.89		1																		1	1											
Galion	6,859	4	7.00	1		1			1											1	1		2									1			
Gallipolis	4,568	7	18.39			2								1				1		2		2	3							1					
Greenville	7.478	7	11.23	2		2		1	1											1	1		4		1		1			2					1
*Kenton	7.091																																		
Lancaster	8,130	15	22.11	8		9		6							1			2		1		1	2	1	1								2	1	
Marietta	11 114	11	11.88	3	1	1																	6					2	2	2			4		1
Marion	14 163	14	11.86			5		4										1		2			5	1	1				1					2	
*Martin's Ferry	8.823																																		
Middletown	11.102	7	7.56	2	2	4		1		2									1	1		1	2						1	1					
Mt. Vernon	6,639	12	21.66		1	1		1												4	3	1	5				1		2	1			1	1	
Norwalk	8,464	10	14.18	2		3	1	1												3	2	1	4					1		2		1			
Piqua	12,114	7	6.93			2					2												4				2	1				1	1		
*Pomeroy	4,219																																		
Salem	7,425	6	9.69	3		2		1	1											1		1	3					1							1
Troy	5,051	7	16.63	1		2								1				1		1		1	3		1				1					1	
Urbana	6,696	7	12.55	2	1															3		3	2		1				1				2		1
Warren	8,075	6	8.92	2		2		2												1		1	3												
Washington C. H.	7,668	1	1.57	1		1													1																
Wellston	12.733	10	9.43	6	2	7		7												2		2													1
Wellsville	7.142	3	5.01																	1	1		1					1						1	
Wooster	5,944	3	6.06																				3	1	1				1						
Xenia	7,499	11	17.66	2	2	1		1												1		1	4						3			1	5		
Totals	223,174	195	10.47	52	11	52	1	26	5	2	3	...	...	2	1	...	...	5	2	35	10	23	73	4	7	......	1	7	14	12	......	4	20	13	9

*No report received. Not included.

Abstract of the Reports of Deaths, and their Causes, in the Following Cities of Ohio, during the Month of August, 1897.

Cities of 10,000 inhabitants (census 1890) or over.	Population (estimated).	Total deaths, all cases.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total zymotic diseases.	Croup and diphtheria.	Cholera infantum.	Cerebro-spinal meningitis.	Cholera morbus.	Diarrhœal diseases.	Dysentery.	Malarial fever.	Measles.	Puerperal fever.	Scarlet fever.	Tonsillitis.	Typhoid fever.	Whooping cough.	Total constitutional diseases.	Cancer.	Phthisis pulmonalis.	Total local diseases.	Apoplexia.	Bright's disease.	Bronchitis.	Convulsions.	Gastritis and peritonitis.	Heart disease.	Meningitis.	Pleurisy.	Pneumonia.	Total developmental diseases.	Total violence.	Premature and still births.
Akron	39.545	48	14.56	17	3	15	......	13	...	...	...	...	...	...	...	...	...	......	...	10	2	4	15	2	2	......	......	......	4	2	......	1	2	5	1
Canton.	44.556	30	6.73	14	5	12	....	8	...	...	1	1	...	...	...	...	...	1	1	4	......	4	7	1	1	......	3	......	1	1	......	......	7	......	......
Chillicothe	14,539	29	30.16	......	......	7	......	4	...	...	...	...	...	...	...	...	..	1	...	4	1	3	8	......	......	1	......	......	1	1	......	......	8	2	2
Cincinnati	344.293	405	14.12	92	37	54	7	9	...	...	7	3	...	...	1	...	1	9	5	82	16	42	206	10	4	8	9	8	24	23	1	19	35	28	43
Cleveland	373,600	472	14.62	185	63	136	5	69	...	3	...	...	...	...	...	...	..	12	4	43	10	12	194	12	4	6	37	21	25	20	......	14	71	25	46
Columbus	128,153	104	9.74	25	10	19	1	10	...	...	3	...	...	...	...	...	...	4	...	33	6	20	31	6	3	1	....	......	......	3	......	2	10	4	5
Dayton	84.426	146	20.75	40	27	68	1	19	1	...	...	23	1	...	...	...	...	4	3	18	4	17	43	2	......	1	2	1	9	1	......	2	9	7	12
East Liverpool	17,595	11	7.50	......	......	2	......	......	..	...	...	...	...	...	...	...	...	......	1	1	......	1	5	....	......	......	......	1	1	......	....	......	1	......	......
Findlay	20,000	26	15.60	13	1	10	......	6	...	..	1	...	...	...	...	1	..	1	..	3	......	3	11	2	......	1	....	......	1	......	......	1	1	1	4
Hamilton	22.771	23	12.12	3	......	4	......	......	...	...	1	...	...	..	...	...	...	1	1	2	1	1	10	......	......	....	1	......	2	1	......	1	5	2	......
Ironton	12,681	20	18.93	3	3	7	......	2	...	. .	1	1	...	...	...	...	...	1	...	1	......	1	3	......	......	1	......	......	......	1	......	1	8	2	......
Lima	26,966	39	17.35	7	14	20	......	16	...	...	...	1	...	...	1	...	..	2	...	......	...	......	8	2	......	......	....	......	3	2	......	1	7	3	5
Mansfield	16.765	15	10.74	3	1	3	......	2	...	...	...	. .	...	...	...	..	...	1	...	3	......	1	7	......	1	......	......	1	3	......	......	......	2	......	......
Massillon	13 255	8	7 24	......	......	2	......	1	..	...	...	...	...	...	...	...	..	1	...	2	1	....	2	......	......	......	......	......	......	......	......	......	2	......	......
Newark	18.833	13	8.28	5	1	5	......	2	...	...	1	1	...	...	...	...	...	1	...	2	1	1	4	1	....	......	2	....	....	......	......	......	2	......	2
Portsmouth	13,205	11	10.06	2	......	......	......	......	...	...	...	...	...	...	...	...	...	......	...	4	1	3	2	......	......	1	......	1	......	....	......	......	3	2	......
Sandusky	20,570	18	10 50	3	7	5	3	2	...	..	...	...	...	...	...	..	...	......	...	3	2	1	4	......	......	......	1	......	1	......	......	......	6	......	1
Springfield	43 121	51	14 19	7	11	12	......	2	...	...	...	2	1	...	1	...	...	1	5	8	2	6	25	1	3	1	......	......	2	3	....	1	4	2	3
*Steubenville	14,386	....	....	......	.....	......	......	......	...	..	...	..	...	..	...	.	...	......	...	......	......	......	......	......	......	....	......	......	......	......	......	......	......	......	......
Tiffin	13,469	13	11.60	1	.....	5	......	4	...	...	...	...	.	...	...	...	...	1	...	3	2	1	4	......	......	......	......	2	1	2	......	......	......	......	......
Toledo.	114,352	149	15.63	48	16	40	......	25	2	...	4	...	1	1	1	...	...	1	...	14	2	12	57	2	3	1	3	1	12	1	...	3	27	11	19
Youngstown	56 810	40	8.45	9	7	8	......	6	...	2	1	...	.	...	...	...	...	2	...	8	2	4	16	......	... ..	1	3	......	3	.....	......	3	4	.....	5
Zanesville	23,307	32	16.50	4	6	8	......	4	...	...	...	...	2	...	...	...	...	1	...	8	3	3	......	.....	......	.....	......	......	1	1	......	......	4	2	2
Totals	1,459,812	1,703	14.00	481	212	442	17	204	3	5	20	32	5	1	4	1	1	48	20	256	56	140	662	41	21	23	61	36	94	62	1	49	218	96	150

*No report received. Not included.

Abstract of the Reports of Deaths and their Causes in the Following Cities of Ohio, during the Month of August, 1897.

Cities of less than 10,000 inhabitants. (Census 1890.)	Population (estimated.)	Total deaths, all causes.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total zymotic diseases.	Croup and diphtheria.	Cholera infantum.	Cerebro-spinal meningitis.	Cholera morbus.	Diarrhœal diseases.	Dysentery.	Malarial fevers.	Measles.	Puerperal fever.	Scarlet fever.	Tonsillitis.	Typhoid fever.	Whooping cough.	Total constitutional diseases.	Cancer.	Phthisis pulmonalis.	Total local diseases.	Apoplexia.	Bright's disease.	Bronchitis.	Convulsions.	Gastritis and peritonitis.	Heart disease.	Meningitis.	Pleurisy.	Pneumonia.	Total developmental diseases.	Total violence.	Premature and still births.
Alliance	10,758	4	4.46	2	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	1	...	...	...	...	...	...	...	1	...	1
Bellaire	11,534	9	9.36	1	3	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	5	...	...	...	...	...	1	2	...	1	2	1	1
Bucyrus	8,147	4	5.89	...	...	2	...	...	...	...	...	...	...	...	...	...	...	1	...	2	...	2	...	...	...	...	...	...	...	...	...	...	...	...	1
Circleville	7,116	5	8.43	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	...	...	...	...	...	...	...	...	...	1	...
*Defiance	9,257	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Delaware	9,304	9	11.61	2	...	5	...	2	...	...	1	...	...	...	...	...	...	2	...	1	...	1	2	...	...	...	...	...	1	...	...	1	1	...	...
Fostoria	11,408	4	4.20	...	...	2	...	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	2	...	1	...	...	...	1	...	...	...	...	...	1
Fremont	6,343	5	9.46	2	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Galion	6,859	5	8.75	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	1	2	2	1	...	...	...	...	1	...	...	...	...	...	...
Gallipolis	4 568	9	23.64	...	...	3	...	2	...	...	...	1	...	...	...	...	...	...	...	1	...	1	3	...	...	...	...	...	1	...	...	...	...	2	...
Greenville	7,178	6	9.60	...	...	4	3		...	...	...	...	...	...	...	...	...	1	...	...	...	...	2	...	...	...	...	...	1	1	...	...	...	...	...
*Kenton	7,091	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Lancaster	8,130	11	16.24	1	2	5	...	...	...	...	2	...	...	...	...	...	...	3	...	3	1	2	2	...	1	...	...	...	...	...	...	1	2	...	...
Marietta	11,114	12	12.96	1	...	2	...	1	...	...	...	...	1	...	...	...	...	...	...	1	1	...	4	...	...	...	...	1	...	...	...	...	1	...	3
Marion	14,163	6	5.08	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	3	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1
*Martin's Ferry	8 823	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Middletown	11,102	9	9.73	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	2	7	1	...	...	...	3	2	...	...	1	...	...	...
Mt. Vernon	6,639	4	7.23	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4	...	...	...	...	1	2	...	...	...	...	...	...
Norwalk	8,464	9	12.76	6	1	4	1	3	...	...	...	...	...	...	...	...	...	...	...	2	2	...	3	...	1	...	...	...	2	...	...	...	...	...	...
Piqua	12,114	9	8.92	...	...	2	1	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	4	...	...	...	...	...	1	...	...	1	2	...	...
*Pomeroy	4,219	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Salem	7,125	2	3.23	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...
Troy	5,051	8	19.00	...	...	2	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	1	4	...	...	...	1	...	1	1	...	...	...	...	...
Urbana	6,696	5	8.96	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	3	...	...	...	1	1	1	...	...	...	...	...	...
Warren	8,075	11	16.35	2	...	4	...	1	...	1	2	...	...	...	...	...	...	...	...	1	1	...	6	...	1	...	...	...	1	1	...	2	...	...	...
Washington C. H	7,668	3	4.70	1	2	2	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	1	...	...	...	...	...	...	3
Wellston	12,733	9	8.48	3	3	6	1	1	1	...	...	3	...	...	...	...	...	...	...	3	...	3	...	...	...	...	...	...	...	...	...	...	...	...	1
Wellsville	7,142	4	6.70	...	...	2	...	2	...	...	...	...	...	...	...	...	...	...	...	1	...	1	1	1	...	...	...	...	...	...	...	...	...	...	...
Wooster	5,944	10	20.18	1	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	9	4	3	...	...	...	...	...	...	1	...	...	...
Xenia	7,499	12	19.20	1	3	2	...	...	1	...	...	...	...	...	...	...	...	1	...	2	...	2	4	...	2	...	...	...	1	...	...	1	3	1	...
Totals	223,474	184	9 88	26	16	53	6	20	2	1	5	5	1	...	...	...	...	9	...	33	7	18	74	7	10	...	2	7	17	5	...	9	12	6	12

* No report received. Not included.

Abstract of the Reports of Deaths, and their Causes, in the Following Cities of Ohio, During the Month of September, 1897.

Cities of 10,000 inhabitants (census 1890) or over.	Population (estimated.)	Total deaths, all causes.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total zymotic diseases.	Croup and diphtheria.	Cholera infantum.	Cerebro-spinal meningitis.	Cholera morbus.	Diarrhœal diseases.	Dysentery.	Malarial fevers.	Measles.	Puerperal fever.	Scarlet fever.	Tonsillitis.	Typhoid fever.	Whooping cough.	Total constitutional diseases.	Cancer.	Phthisis pulmonalis.	Total local diseases.	Apoplexia.	Bright's disease.	Bronchitis.	Convulsions.	Gastritis and peritonitis.	Heart disease.	Meningitis.	Pleurisy.	Pneumonia.	Total developmental diseases.	Total violence.	Premature and still births.
*Akron	39,545	......	......	......	......	....	......	......	...	...	...	...	...	...	...	...	...	......	...	......	......	......	......	......	......	......	.....	....	......	......	......	......	......	......	.....
Canton	44,556	21	5.66	6	5	8	5	1	...	...	...	...	...	...	...	...	...	1	1	1	......	1	6	1	1	......	1	....	1	1	.....	1	6	......	......
Chillicothe	11 539	19	19.76		.....	1	......	2	...	...	...	...	...	...	...	...	...	1	...	5	......	5	5	......	2	......	.....	......	......	1	......	......	5	.....	......
Cincinnati	344,293	402	14.01	82	56	60	10	13	...	..	6	2	...	...	...	1	1	9	2	89	13	55	202	7	5	11	10	9	25	23	4	21	28	24	45
Cleveland	373 600	397	12.59	110	60	75	5	36	1	3	...	3	...	...	2	1	...	4	1	64	20	23	154	5	2	8	22	15	18	17	1	23	69	29	38
Columbus	128,153	121	11.61	14	21	23	3	8	5	...	...	4	...	...	...	...	...	2	...	36	7	27	34	5	3	......	2	3	......	......	1	3	18	13	7
Dayton	84,426	111	16.20	25	15	31	1	5	1	1	...	9	1	...	...	...	...	4	2	22	7	13	32	1	1	......	5	1	6	2	......	3	22	6	5
East Liverpool	17,595	4	2 73	2	1	1	......	......	...	...	...	...	...	...	...	...	...	......	1	......	......	......	1	......	......	......	......	.. ..	......	1	......	......	......	......	......
Findlay	20,000	15	9.00	3	1	1	1	......	...	...	...	...	...	...	...	...	...	3	...	1	......	1	9	1	1	......	......	......	2	1	......	......	......	1	5
Hamilton	22,771	16	8.43	5	....	1	......	.....	...	...	...	...	1	...	...	...	...	......	...	5	1	3	8	......	......	......	......	.....	3	1	......	......	1	1	.... .
Ironton	12.681	15	11.20	1	2	4	2	1	...	..	...	...	.	...	1	...	...	......	...	1	......	1	5	......	2	1	......	......	1	......	......	1	5	......	......
Lima	26,966	41	18.25	12	3	20	5	8	1	...	...	3	...	...	...	...	...	1	..	1	1	.....	9	1	1	......	......	......	7	......	......	......	7	4	1
Mansfield	16,765	17	12.17	4	1	2	......	1	...	..	...	...	...	...	...	...	...	1	...	5	1	4	7	......	......	......	......	.... .	3	1	......	1	2	.....	2
Massillon	13,255	9	8 15	......	.....	1	1	......	...	...	...	...	...	...	...	...	...	... ..	...	2	......	1	5	.....	......	......	......	1	......	......	......	.....	1	.....	......
Newark	18,833	18	11.47	3	4	5	1	3	...	...	...	...	...	...	...	...	1	......	...	4	......	4	7	......	......	1	......	2	1	2	......	1	......	2	3
Portsmouth	13,255	12	10.90	5	......	3	1	1	...	...	...	1	...	...	...	...	...	......	...	4	......	4	......	......	......	......	......	......	......	......	......	......	5	......	3
Sandusky	20,570	11	6.42	......	3	1	1	.....	...	...	...	...	...	...	...	...	...	......	...	4	1	2	4	......	......	1	......	......	1	......	......	......	1	1	1
Springfield	43,121	29	8.07	4	5	6	......	......	...	...	...	...	...	...	...	...	...	3	3	4	1	2	17	1	2	......	......	.....	4	3	......	......	1	1	5
Steubenville	14,386	3	2.50	......	....	......	......	......	...	...	...	...	...	...	...	...	...	......	. .	......	......	......	3	......	......	.....	.....	1	......	......	.....	1	......	......	.....
Tiffin	13,469	17	15.15	1	......	3	......	3	...	..	...	...	...	...	...	...	...	......	...	4	3	1	8	......	1	.....	1	......	5	1	......	......	1	......	......
Toledo	114,352	128	13.43	47	15	33	2	12	...	...	1	...	3	...	...	...	1	7	1	12	4	7	41	....	2	1	13	2	2	2	......	4	34	9	12
Youngstown	56,810	31	7.20	6	7	6	...	3	...	...	...	...	...	...	...	1	...	1	...	4	1	2	15	1	......	1	2	1	2	1	......	.....	2	4	3
Zanesville	23 307	22	11.33	2	......	5	......	1	..	...	...	...	...	...	1	...	...	3	...	4	1	1	8	1	2	......	......	......	.....	......	.....	2	......	5	......
Totals	1,434,651	1,463	12.24	332	199	296	38	98	8	4	7	22	5	...	4	3	3	40	11	272	61	157	580	24	25	24	56	35	81	57	6	61	208	100	130

*No report received. Not included.

Abstract of the Reports of Deaths, and their Causes, in the Following Cities of Ohio, during the Month of September, 1897.

Cities of less than 10,000 inhabitants (census 1890).	Population (estimated	Total deaths, all causes.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total zymotic diseases.	Croup and diphtheria.	Cholera infantum	Cerebro-spinal meningitis.	Cholera morbus.	Diarrhœal diseases	Dysentery	Malarial fevers.	Measles.	Puerperal fever.	Scarlet fever.	Tonsillitis.	Typhoid fever.	Whooping cough.	Total constitutional diseases.	Cancer.	Phthisis pulmonalis.	Total local diseases.	Apoplexia.	Bright's disease.	Bronchitis.	Convulsions.	Gastritis and peritonitis.	Heart disease.	Meningitis.	Pleurisy.	Pneumonia.	Total developmental diseases.	Total violence.	Premature and still births.
Alliance	10,758	11	12 27	2	...	2	...	1	...	...	...	...	...	...	1	...	...	...	...	1	...	1	6	...	...	...	...	...	1	...	...	...	1	...	1
Bellaire	11 534	9	9 36	5	1	2	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5	1	1	...	1	...	...	2	...	...	2	2	...
Bucyrus	8,147	9	13.26	...	...	2	1	...	...	...	...	...	...	...	...	...	...	1	...	2	1	1	5	...	1	...	...	...	3	...	...	1	...	...	1
Circleville	7,116	6	10.12	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	4	...	...	...	...	...	...	...	...	...	...	...	1
*Defiance	9,257	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Delaware	9,301	9	11.61	1	...	1	...	...	...	...	1	...	...	...	...	...	...	...	...	3	1	1	3	...	...	1	...	...	1	1	...	...	1	...	...
Fostoria	11,108	6	6.32	...	...	4	...	1	...	...	...	...	...	...	...	...	...	3	...	...	...	...	2	1	...	...	...	...	1	...	...	...	...	...	...
Fremont	6,343	2	3 78	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...
Galion	6,859	2	3.50	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	1	...	...	...	...	...	...	...	...	1	...	...	...
Gallipolis	4,568	5	13.13	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4	...	...	...	...	...	1	...	...	2	...	...	...
Greenville	7,478	5	8.02	...	1	2	...	1	...	...	...	...	...	...	...	1	...	...	...	2	1	1	1	...	...	...	...	...	1	...	...	...	...	...	...
*Kenton	7,091	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Lancaster	8,130	9	13.28	2	1	4	...	3	...	...	...	2	...	...	...	...	...	2	...	1	...	1	1	...	1	...	...	...	...	...	...	...	...	...	1
Marietta	11,114	10	10.80	5	1	5	1	2	...	...	...	1	...	...	...	...	...	...	1	1	...	1	3	...	...	...	...	...	1	1	...	...	...	1	...
Marion	14,163	9	7.63	2	...	7	...	1	...	...	...	...	...	...	...	...	...	2	...	1	...	...	3	...	...	...	...	...	1	1	...	...	...	1	...
*Martin's Ferry	8,823	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Middletown	11,102	6	6 18	...	...	2	...	...	...	...	...	1	...	...	...	...	...	1	...	...	...	...	4	3	...	...	...	...	1	...	...	...	...	...	...
Mt. Vernon	6,639	2	3.61	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	1
Norwalk	8,461	8	11.34	2	...	2	...	1	...	...	1	...	...	...	...	...	...	...	...	1	1	...	5	...	2	...	...	1	2	...	...	...	...	...	...
Piqua	12,114	8	7.92	...	...	2	2	...	...	...	...	...	...	...	...	...	...	...	...	2	1	1	...	...	...	...	...	...	...	...	...	...	2	2	...
*Pomeroy	4,219	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
*Salem	7,425	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Troy	5,051	8	19.00	...	...	2	1	...	...	...	...	...	...	...	...	...	...	2	...	3	1	2	1	...	...	...	...	...	1	...	...	...	1	...	1
Urbana	6.696	7	12.55	1	1	3	1	...	1	...	...	...	...	...	...	...	...	...	...	3	...	3	...	...	...	...	...	...	...	...	...	...	1	1	...
Warren	8,075	5	7.43	1	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	2	...	2	2	1	...	...	...	...	1	...	...	...	...	...	...
Washington C. H.	7,668	5	7.82	3	...	2	...	...	...	...	...	...	...	...	...	...	...	...	2	1	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...
Wellston	12,733	7	6 60	...	2	3	2	...	...	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	...	...	...	...	1	...	...	...	...	1	...
Wellsville	7,142	4	6 70	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	1	...	...	...	...	...	...	1	...	...	...
Wooster	5,944	10	20.18	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	1	1	8	2	2	...	...	2	...	...	...	2	...	...	...
Xenia	7,499	15	24.19	1	2	2	1	1	...	...	...	...	...	...	...	...	...	...	...	4	1	3	3	...	...	...	...	...	3	...	...	...	6	...	...
Totals	216,049	177	9,83	27	9	52	11	15	1	...	2	4	...	...	1	1	...	12	3	32	9	21	64	8	8	1	1	3	19	5	...	7	15	10	6

*No report received. Not included.

Abstract of the Reports of Deaths, and their Causes, in the Following Cities of Ohio, During the Month of October, 1897.

Cities of 10,000 inhabitants (census 1890) or over.	Population (estimated).	Total deaths, all causes.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total zymotic diseases.	Croup and diphtheria.	Cholera infantum.	Cerebro-spinal meningitis.	Cholera morbus.	Diarrhœal diseases.	Dysentery.	Malarial fevers.	Measles.	Puerperal fever.	Scarlet fever.	Tonsillitis.	Typhoid fever.	Whooping cough.	Total constitutional diseases.	Cancer.	Phthisis pulmonalis.	Total local diseases.	Apoplexia.	Bright's disease.	Bronchitis.	Convulsions.	Gastritis and peritonitis.	Heart disease.	Meningitis.	Pleurisy.	Pneumonia.	Total developmental diseases.	Total violence.	Premature and still births.
*Akron	39,545	...	...	...	...	...	...	...		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Canton	44,556	20	5.39	3	3	5	...	3	...	...	...	...	...	...	...	...	...	2	...	4	2	2	7	3	1	...	...	1	1	1	...	...	4	...	...
Chillicothe	11,539	20	20.80	...	...	5	1	...	...	...	...	...	...	...	...	1	...	3	...	1	...	1	7	...	1	1	...	8	.	...	...	1	5	2	1
Cincinnati	341,293	419	14.60	85	42	63	20	...	...	...	11	4	...	...	...	1	...	9	4	86	23	11	222	11	5	22	8	14	27	18	...	37	31	24	35
Cleveland	373,600	409	13.14	105	43	60	21	10	...	...	...	...	...	...	...	2	...	10	2	55	16	14	208	7	11	9	33	5	27	16	...	33	59	27	37
Columbus	128,153	120	11.24	17	9	17	5	3	...	...	...	1	...	...	...	1	...	3	..	35	13	19	43	9	6	...	1	2	...	3	...	3	15	9	3
Dayton	84,426	68	9.66	12	7	13	...	3	...	...	...	3	...	...	...	...	...	3	...	11	2	6	32	1	1	...	...	...	7	5	...	3	9	3	8
East Liverpool	17,595	6	4.09	3	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	2	...	...	...	...	...	...		...	...	...	...	...	...
Findlay	20 000	18	10.80	5	...	6	1	1	...	...	...	...	1	...	...	...	...	...	...	7	...	7	2	...	...	...	...	...	...	...	...	...	3	...	3
Hamilton	22 771	20	10.54	9	...	2	...	...	...	...	...	...	...	...	...	1	...	...	...	5	...	5	11	...	...	...	...	...	6	...	...	1	2	...	...
Ironton	12,681	6	5 68	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	3	...	...	1	...	...	1	...	...	1	2	...	...
Lima	26,966	30	13.35	3	8	7	4	2	...	...	..	1	...	...	...	...	...	...	...	6	3	3	6	...	1	1	...	...	3	...	...	1	10	1	2
Mansfield	16,765	10	7.24	1	2	...	...	...	...	...	...	...	...	...	...	...	...	.. .	...	...	...	...	8	1	1	...	2	...	...	...	...	...	1	1	...
Massillon	13,255	5	4.53	...	...	3	1	...	...	...	..	...	...	...	...	...	...	2	..	...	...	...	2	2	...	...	...	...	...	...	...	...	...	...	...
Newark	18,833	16	10.20	3	1	3	...	2	...	...	1	...	...	...	...	...	...	...	...	1	...	1	8	2	3	...	...	1	1	...	...	1	1	2	1
Portsmouth	13,205	24	21 80	1	2	8	6	1	...	1	..	...	...	...	...	...	...	...	...	1	...	1	4	1	...	...	...	...	1	...	...	2	10	1	4
Sandusky	20,570	12	7 00	1	2	5	4	1	..	...	..	...	...	...	...	...	...	...	..	2	...	2	2	...	...	...	...	...	1	...	...	1	2	1	2
Springfield	43,121	13	11.95	5	2	8	...	...	...	...	...	2	...	...	..	...	..	5	1	6	2	4	23	3	4	2	...	2	3	...	...	2	5	1	6
Steubenville	14,386	2	1.67	...	...	...	...	...	...	...	...	...	...	..	...	...	..	...		1	...	1	1	...	...	1	...	...	...	...	...	...	...	...	...
Tiffin	13,469	9	8.00	...	...	1	...	...	...	...	...	1	...	...	...	...	...	...	..	1	...	1	4	...	...	...	...	...	3	...	...	1	2	1	...
Toledo	114,352	124	13.01	44	10	26	5	11	1	1	3	...	...	...	...	...	...	3	...	11	3	6	49	...	2	1	6	2	3	1	...	3	27	11	17
Youngstown	56,810	35	7.40	10	2	4	...	2	...	...	...	...	...	...	...	...	...	1	...	3	1	2	22	...	...	3	3	...	1	1	...	5	4	2	5
Zanesville	23,307	17	8.80	1	2	1	...	1	...	...	...	..	1	..	...	1		1	...	3	2	1	6	...	...	...	...	...	3	...	...	...	4	...	...
Total	1,134,651	1,433	11.29	309	132	240	68	40	1	2	15	12	2	..	...	7	...	42	7	212	67	120	670	43	36	41	53	35	88	45	...	95	199	86	124

*No report received. Not included.

Abstract of the Reports of Deaths, and their Causes, in the Following Cities of Ohio, During the Month of October, 1897.

Cities of less than 10,000 inhabitants. (census 1890.)	Population estimated.)	Total deaths, all causes.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total zymotic diseases.	Croup and diphtheria.	Cholera infantum.	Cerebro-spinal meningitis.	Cholera morbus.	Diarrhœal diseases.	Dysentery.	Malarial fevers.	Measles	Puerperal fever.	Scarlet fever.	Tonsillitis.	Typhoid fever.	Whooping cough.	Total constitutional diseases.	Cancer.	Phthisis pulmonalis.	Total local diseases.	Apoplexia.	Bright's disease.	Bronchitis	Convulsions.	Gastritis and peritonitis.	Heart disease.	Meningitis.	Pleurisy.	Pneumonia.	Total developmental diseases.	Total violence.	Premature and still births.
Alliance	10,758	6	6.69	1	1	1	1	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	1	...	...	...	...	...	1	...	...	...	2	...	...
Bellaire	11,534	6	6.23	...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	1	...	1	4	3	...	...	...	...	...	...	...	1	...	...	...
Bucyrus	8,117	5	7.36	...	...	3	...	...	...	...	...	...	1	...	...	...	...	2	...	...	...	...	1	...	...	...	...	...	1	...	...	...	...	1	...
Circleville	7,116	16	26.98	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	4	...	...	9	...	...	...	...	...	...	...	...	...	...	1	...
*Defiance	9,257	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Delaware	9,301	7	9 03	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	2	5	...	1	...	...	2	1	1	...	...	...	...	1
Fostoria	11,408	4	1.20	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4	...	...	...	1	1	1	...	...	1	...	...	...
Fremont	6,313	6	11.35	1	5	3	2	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	2	...	...	...	...	...	1	...	...	...	1	...	...
Galion	6,859	6	10.50	1	...	4	...	...	1	...	...	1	...	...	...	...	...	1	...	1	...	1	1	...	1	...	...	...	...	...	...	...	...	...	...
Gallipolis	1,568	8	21.02	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	2	1	1	5	...	...	...	...	...	1	...	...	...	...	...	...
Greenville	7,178	6	9.60	...	...	2	1	...	...	...	...	...	...	...	...	...	...	1	...	3	1	2	1	...	...	...	...	...	1	...	...	...	...	...	...
*Kenton	7,091	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Lancaster	8,130	1	5.90	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	1	...	...	...	...	...	1	...	...	...	1	...	...
Marietta	11,114	6	6.48	1	...	2	2	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	1	...	...	...	...	1	...	...	...	...	...	...	...
Marion	14,163	3	2.51	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	1	...
*Martin's Ferry	8,823	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Middletown	11,102	12	12 96	2	2	3	...	...	...	...	1	...	...	...	...	...	...	...	1	3	1	2	3	...	1	...	...	...	1	...	...	1	...	3	...
Mt. Vernon	6,639	6	10.83	...	1	2	...	...	...	...	...	...	...	...	...	...	...	2	...	1	...	1	2	...	...	...	...	...	...	1	...	...	...	1	...
Norwalk	8,464	4	5.67	1	...	2	1	1	...	...	...	...	...	...	...	...	...	...	...	1	...	1	1	...	...	...	...	...	1	...	...	...	...	...	...
Piqua	12.114	16	15 81	2	3	5	1	1	...	...	...	...	...	...	...	...	...	...	...	5	...	4	3	...	...	...	...	...	...	1	...	...	3	...	...
*Pomeroy	4,219	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Salem	7,125	2	3.23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	1	...	...	...	...	...	...	...
Troy	5,051	8	19.00	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	1	1	5	...	...	...	...	1	1	2	...	1	1	...	...
Urbana	6,696	6	10.75	1	1	2	1	1	...	...	...	...	...	...	...	...	...	...	...	3	...	3	1	...	...	...	...	...	1	...	...	...	...	...	1
Warren	8 075	2	2.98	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...
Washington C. H.	7 668	9	14.08	1	1	4	...	3	...	...	...	...	...	...	...	...	...	...	...	2	1	1	3	...	...	...	...	...	1	...	...	...	...	...	...
Wellston	12,733	10	9.13	...	...	7	3	...	...	...	...	...	4	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	1	1	...	...	1	...	1
Wellsville	7.112	12	20.16	...	...	2	1	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	7	1	...	...	2	1	2	...	...	1	...	...	...
Wooster	5,911	6	12.12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	1	2	2	...	...	...	...	...	...	...	...	1	...
Xenia	7,199	11	17.66	2	3	1	...	...	1	...	...	...	...	...	...	...	...	...	...	2	...	2	3	...	...	...	...	1	1	...	...	1	5	...	...
Totals	223,474	187	10.04	19	18	48	17	6	3	...	1	2	5	...	...	...	1	6	1	38	7	25	71	6	5	...	8	8	17	6	...	6	14	8	6

* No report received. Not included.

Abstract of the Reports of Deaths, and their Causes, in the Following Cities of Ohio, during the Month of November, 1897.

Cities of 10,000 inhabitants (census of 1890) or over.	Population (estimated).	Total deaths, all causes.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total zymotic diseases.	Croup and diphtheria.	Cholera infantum.	Cerebro-spinal meningitis.	Cholera morbus.	Diarrhoeal diseases.	Dysentery.	Malarial fevers.	Measles.	Puerperal fever.	Scarlet fever.	Tonsillitis.	Typhoid fever.	Whooping cough.	Total constitutional diseases.	Cancer.	Phthisis pulmonalis.	Total local diseases.	Apoplexia.	Bright's disease.	Bronchitis.	Convulsions.	Gastritis and peritonitis.	Heart disease.	Meningitis.	Pleurisy.	Pneumonia.	Total developmental diseases.	Total violence.	Premature and still births.
*Akron	39 545	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Canton	44,556	21	5,66	2	4	3	1	...	...	...	...	1	...	...	...	...	...	1	...	3	1	2	8	1	...	2	...	2	...	1	...	2	7	...	...
Chillicothe	11 539	14	13,56	...	...	2	1	...	...	...	...	...	...	...	...	...	...	1	...	1	...	1	...	...	...	...	2	...	2	2	...	...	...	1	1
Cincinnati	341,293	458	15,09	76	48	49	15	1	...	1	5	4	...	...	...	2	...	6	2	101	19	53	251	16	6	8	4	16	28	21	...	41	35	19	19
Cleveland	373,600	357	11,17	76	39	14	20	...	...	...	2	...	1	...	...	2	...	9	1	46	11	7	181	8	2	11	18	12	20	12	1	57	69	16	33
Columbus	128 153	93	8,71	10	7	7	2	1	...	...	1	...	...	...	...	...	...	2	...	22	4	16	44	9	2	2	...	4	...	3	...	6	10	10	10
Dayton	81,426	83	11,80	25	8	11	1	1	...	1	...	1	...	...	...	...	...	5	...	7	4	3	29	...	1	2	3	6	5	2	...	10	4	2	11
East Liverpool	17,595	11	9,55	3	3	2	2	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	4	...	...	...	1	...	1	1	...	1	...	...	...
Findlay	20.000	20	12,00	4	2	4	2	...	...	...	1	...	...	...	...	...	...	1	...	2	1	1	9	1	1	...	1	...	3	...	...	...	4	1	2
Hamilton	22,771	18	9,50	5	...	1	...	...	...	...	...	...	...	...	...	1	...	...	...	3	...	3	9	...	...	...	1	...	3	...	...	...	4	1	...
Ironton	12.681	8	7,57	1	1	1	1	...	...	...	...	...	...	...	...	...	...	...	...	3	...	3	3	...	...	1	...	...	2	...	...	...	1	...	...
Lima	26 966	29	12,90	3	2	7	4	...	...	...	...	1	1	...	...	1	...	...	...	2	...	2	11	3	...	...	...	...	4	...	...	1	6	3	1
Mansfield	16.765	21	15,03	...	6	6	4	...	...	...	...	...	1	...	...	...	...	1	...	...	...	...	11	...	1	1	...	...	2	...	...	...	3	1	1
Massillon	13,255	7	6,31	...	...	2	...	...	...	...	...	...	...	...	...	...	...	1	...	3	...	2	1	...	...	...	...	...	...	...	...	...	...	1	...
Newark	18 832	22	11,02	4	1	5	3	...	...	...	...	1	...	...	...	...	...	1	...	3	...	3	9	...	1	1	...	2	2	1	...	2	3	2	3
Portsmouth	13,205	12	10,90	4	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	7	...	...	1	2	...	2	1	...	1	4	...	...
Sandusky	20,570	15	8,75	...	...	4	3	...	...	...	...	...	...	...	1	...	...	...	...	1	...	1	7	...	1	...	...	...	6	...	...	...	2	2	3
Springfield	43.121	38	10,58	4	12	11	6	...	...	...	...	...	...	...	1	1	...	2	1	2	...	...	17	1	2	1	1	2	2	2	1	3	6	2	5
*Steubenville	11,386	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Tiffin	13,469	8	7,13	...	...	1	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	3		...	...	1	1	...	1	...	1	3	1	...
Toledo	114.352	121	13,01	29	9	24	2	5	6	...	...	1	...	...	...	...	...	4	1	22	5	14	52	2	1	...	3	2	5	2	...	8	16	10	17
Youngstown	56,810	42	8,08	11	5	8	...	1	...	...	...	...	1	...	...	1	...	3	2	3	...	1	25	2	...	3	5	...	1	...	...	8	4	1	6
Zanesville	23,307	29	14,90	1	1	5	1	...	...	...	...	...	...	...	...	...	...	3	...	5	3	1	12	1	3	...	...	...	1	...	...	2	1	2	2
Totals	1,420 265	1,423	12,10	258	150	197	68	9	6	2	9	10	4	...	2	8	...	40	7	234	51	115	693	41	21	33	42	47	89	52	2	149	182	75	144

*No report received. Not included.

Abstract of the Reports of Deaths, and their Causes in the Following Cities of Ohio, During the Month of November, 1897.

Cities of less than 10,000 inhabitants (Census 1895.)	Population estimated.	Total deaths, all causes.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total zymotic diseases.	Croup and diphtheria.	Cholera infantum	Cerebro-spinal meningitis.	Cholera morbus.	Diarrheal diseases.	Dysentery.	Malarial fevers.	Measles.	Puerperal fever.	Scarlet fever.	Tonsillitis.	Typhoid fever.	Whooping cough.	Total constitutional diseases.	Cancer.	Phthisis pulmonalis.	Total local diseases	Apoplexia.	Bright's disease	Bronchitis.	Convulsions.	Gastritis and peritonitis.	Heart disease.	Meningitis.	Pleurisy.	Pneumonia.	Total developmental diseases.	Total violence.	Premature and still births.
Alliance	10,758	7	7.80	1	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	2	4	...	...	...	...	...	...	...	...	2	...	...	...
Bellaire	11 531	8	8.33	1	2	3	...	...	...	...	...	...	...	...	...	2	...	1	...	3	...	1	1	...	...	...	...	...	...	...	...	...	1	...	...
Bucyrus	8.117	6	8.84	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5	...	1	...	...	...	2	...	1	1	...	...	...
Circleville	7,116	10	16.86	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	9	...	...	...	...	...	...	...	...	...	...	...	...
*Defiance	9 257	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Delaware	9,304	5	6.45	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	2	3	...	...	...	2	...	...	...	...	1	...	...	...
Fostoria	11 408	3	3.16	1	...	1	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	...	...	...	1	1
Fremont	6,313	4	7.56	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	1	...	...	...	...	...	...	1	...	...	1	1	...
Galion	6,859	4	7.00	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	2	2	...	...	...	...	...	1	...	...	1	...	...	...
Gallipolis	4 568	8	21.02	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	5	...	...	...	...	1	...	...	...	1	2	...	...
Greenville	7.478	3	4 80	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	1	...	...	...	2	...	...	...	...	...	...
Kenton	7 091	5	8.46	1	...	2	...	1	...	...	...	...	...	...	...	...	...	1	...	2	1	1	...	...	...	...	...	...	...	...	...	...	1	...	...
Lancaster	8.130	11	16.24	...	...	2	...	...	...	...	1	...	...	...	...	...	...	...	...	4	...	3	2	1	1	...	...	...	...	...	...	...	2	1	...
Marietta	11 114	12	12 96	...	1	5	3	...	...	...	...	...	...	...	...	...	...	2	...	1	1	...	5	...	...	...	...	3	...	...	...	1	...	...	2
Marion	14,163	10	8.48	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	2	1	...	5	...	...	...	...	1	2	...	...	...	...	2	...
*Martin's Ferry	8,823	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Middletown	11,102	5	5.40	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	4	1	...	...	1	...	1	...	...	1	...	...	...
Mt. Vernon	6,639	10	18.08	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	1	6	1	...	...	...	...	1	...	...	1	1	1	...
Norwalk	8,464	5	7.09	...	...	2	1	...	...	...	1	...	...	...	...	...	...	...	...	1	...	1	2	1	...	...	...	...	...	1	...	...	...	...	...
Piqua	12,111	11	10.89	...	2	3	2	...	...	...	...	...	...	...	...	...	...	1	...	2	2	...	3	...	1	...	...	...	...	2	...	...	1	2	...
*Pomeroy	4 219	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Salem	7 425	8	12.93	...	...	3	...	...	1	...	...	...	...	...	...	...	...	1	...	1	...	...	2	1	...	...	...	...	...	...	...	...	1	1	...
Troy	5 051	6	14.26	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	2	1	1	3	...	...	...	...	...	2	...	...	...	...	...	...
Urbana	6 696	6	10.75	2	1	1	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	4	1	...	...	1	...	1	...	...	1	...	...	1
Warren	8,075	9	13.38	1	2	1	...	...	...	...	...	...	...	...	...	...	...	1	...	2	...	2	4	...	...	...	...	...	2	...	...	2	...	1	3
Washington C. H.	7,668	6	9.10	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	4	...	...	...	...	...	...	...	...	2	1	...	3
Wellston	12,733	9	8.48	...	...	4	1	...	...	...	...	1	1	...	...	...	...	...	...	1	1	...	1	...	...	...	1	...	...	...	...	...	...	3	1
Wellsville	7,142	5	8.40	...	...	4	1	...	1	...	...	...	...	...	...	...	...	1	...	...	...	...	1	...	...	...	...	...	...	...	...	1	...	...	1
Wooster	5,944	6	12 12	1	...	2	1	...	...	...	...	...	...	...	...	...	...	1	...	2	...	1	2	...	...	...	...	1	...	...	...	1	...	...	...
*Xenia	7,199	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Totals	223,066	182	9.80	12	13	39	9	1	2	...	3	1	2	...	...	2	...	10	...	34	7	21	82	6	4	...	5	6	15	4	1	16	11	13	12

*No report received Not included.

Abstracts of the Reports of Deaths, and their Causes, in the Following Cities of Ohio, during the Month of December, 1897.

Cities of 10,000 inhabitants (census of 1890) over.	Population (estimated.)	Total deaths, all causes.	Annual rate per 1,000	Total under one year.	Total under five years and over one year.	Total zymotic diseases.	Croup and diphtheria.	Cholera infantum.	Cerebro-spinal meningitis.	Cholera morbus.	Diarrhœal diseases.	Dysentery.	Malarial fevers.	Measles.	Puerperal fever.	Scarlet fever.	Tonsillitis.	Typhoid fever.	Whooping cough.	Total constitutional diseases.	Cancer.	Phthisis pulmonalis.	Total local diseases.	Apoplexia.	Bright's disease.	Bronchitis.	Convulsions.	Gastritis and peritonitis.	Heart disease.	Meningitis.	Pleurisy.	Pneumonia.	Total developmental diseases.	Total violence.	Premature and still births.
*Akron	39,545	....	....	....	......	......	....	...	......	...	...	...	...	...	...	...	...	...	...	......	....	....	....	......	......	......	.....	.....	......	....	... ..	......	.....	......	......
Canton	44,556	25	6.73	7	1	4	.....	....	......	...	...	...	...	...	...	..	...	1	1	3	1	1	7	1	....	......	1	......	1	1	......	3	11	....	......
Chillicothe	11,539	19	19.76	......	......	2	2	....	......	...	...	...	...	..	..	...	...	...	...	2	1	1	10	1	2	....	......	1	3	...	......	1	4	1	1
Cincinnati	344,293	463	16.14	63	19	54	16	1	2	...	5	1	...	2	...	..	...	11	3	92	13	58	264	15	12	26	7	12	26	13	......	64	33	20	42
Cleveland	373 600	426	13.68	73	51	48	17	2	3	...	...	...	1	1	...	3	..	5	1	60	13	16	234	16	9	13	26	6	33	15	1	59	51	22	33
Columbus	128,153	125	11 70	17	10	17	2	...	......	...	...	...	...	2	...	1	...	6	1	22	8	13	67	18	7	3	3	2	......	4	......	18	11	8	19
Dayton	84 426	86	12.22	25	5	5	1	1	3	...	...	...	...	..	...	...	...	...	...	11	1	10	5	2	.. ...	......	......	......	....	3	....	.....	......	5	4
East Liverpool	17,595	20	13.61	......	.....	....	.....	....	.....	...	...	...	...	...	...	...	..	...	...	.....	.....	.....	... ..	......	.....	......	.....	......	.....	......	......	......	......	......	......
Findlay	20 000	17	10.20	2	1	......	......	.....	....	...	...	...	...	...	...	...	...	...	...	3	1	2	11	....	1	1	....	......	3	.....	...	1	......	3	13
Hamilton	22,771	27	14.23	6	......	4	....	....	......	..	2	...	1	..	...	...	.	...	...	4	......	......	11	......	......	......	......	.....	2	1	......	2	1	1	......
Ironton	12,681	11	10.41	..	1	1	.....	......	... .	...	1	...	...	...	...	...	...	...	...	4	1	2	5	1	.....	.....	......	1	1	1	1	....	1	......	......
Lima	26,966	20	8.90	1	3	5	2		.....	...	...	...	...	...	...	...	..	1	1	1	....	1	6	..	......	.....	1	.....	4	......	....	1	7	1	1
Mansfield	16,765	7	5.01	......	......	2	....	. ..	..	...	...	...	1	..	...	...	...	1	...	......	....	......	3	2	......	.....	......	......	....	...	......	.....	2	......	......
Massillon	13 255	6	5.43	......	......	2	1	.....	......	...	. .	...	...	...	...	..	...	...	...	3	2	....	......	......	......	......	.....	......	.... .	.....	....	......	1	.. .	......
Newark	18,833	17	10 83	....	2	1	1	.....	......	...	...	...	...	...	...	...	...	...	...	6	1	5	8	2	1	.....	....	....	3	1	......	1	1	1	2
Portsmouth	13,205	12	10.90	1	1	3	2	.....	.....	...	...		...	...	...	...	...	1		3	......	3	4	1	.....	......	.....	......	1	......	. .	2	2	......	1
Sandusky	20,570	13	7 06	......	......	......	......	......	......	...	...	...	...	...	...	...	...	...	..	3	.....	2	3	......	1	....	....	1	1	...	..	......	4	3	3
Springfield	43 121	58	16.14	3	11	16	3	....	1	...		...	...	11	..	...	...	1	...	10	2	7	24	8	2	2	1	2	5	1	.....	1	5	3	.....
*Steubenville	14,386	....	....	......	.....	......	.....	......	.	...	...	..	...	..	...	...	...	...	...		......	......	.... .	......	......	.....	......	.....	......	....	.....	......	.....	......	...
Tiffin	13,469	6	5.35	.. .	....	.....	...	....	......	...	...	...	..	..	...	...	...	..	...	3	1	2	2	1	.....	.....	.... .	......	1	....	.....	......	1	......	......
Toledo	114,352	115	12.07	20	8	21	2	.....	1	...		1	...	..	...	...	...	7	...	14	4	9	61	......	1	2	6	9	10		....	15	9	7	19
Youngstown	56 810	30	6.34	4	3	6	3	......	.....	...	...	...	...	...	...	...	.	3	...	1	1	1	15	1	......	3	......	......	2	1	....	3	3	2	8
Zanesville	23,307	24	12.36	1	3	4	......	......	......	...	...	...	...	...	...	2	...	1	1	4	3	1	10	3	.. ...	.....	1	1	...	1	.....	3	5	......	1
Totals	1,420,265	1,527	12.19	226	151	195	52	4	10	...	8	2	3	16	..	6	...	38	8	252	53	131	753	72	36	50	46	35	96	42	2	174	155	77	149

*No report received Not included.

Abstract of the Reports of Deaths, and their Causes, in the Following Cities of Ohio, during the Month of December, 1897.

Cities of less than 10,000 inhabitants. (Census 1890.)	Population (estimated.)	Total deaths, all causes.	Annual rate per 1,000.	Total under one year.	Total over five years and over one year.	Total zymotic diseases.	Croup and diphtheria.	Cholera infantum.	Cerebro-spinal meningitis.	Cholera morbus.	Diarrhoeal diseases.	Dysentery.	Malarial fevers.	Measles.	Puerperal fevers.	Scarlet fever.	Tonsillitis.	Typhoid fever.	Whooping cough.	Total constitutional diseases.	Cancer.	Phthisis pulmonalis.	Total local diseases.	Apoplexia.	Bright's disease.	Bronchitis.	Convulsions.	Gastritis and peritonitis.	Heart disease.	Meningitis.	Pleurisy.	Pneumonia.	Total developmental diseases.	Total violence.	Premature and still births.
Alliance	10,758	11	12. 7	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	2	1	7	...	...	...	1	...	2	...	...	1	1	...	1
Bellaire	11,534	8	8.33	1	2	1	...	...	...	...	...	...	...	...	...	...	...	1	...	2	...	2	5	1	...	...	...	1	...	1	...	1	...	...	...
Bucyrus	8 147	5	7.36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	3	...	...	...	...	...	1	...	1	1	...	1	1
Circleville	7,116	16	26 98	1	1	2	...	...	...	...	...	...	...	...	...	...	...	1	...	3	1	2	11	...	1	...	...	1	...	1	...	8	...	...	...
*Defiance	9 257	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Delaware	9 304	4	5.16	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	1	1	...	1	1	...	...	...	...	...	...	...	...	1	...	...
Fostoria	11,108	6	6.32	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5	1	...	1	...	...	1	...	...	...	...	...	1
Fremont	6,313	2	3.78	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	1	...	...	...	...	...	1	...	...	...	...	...	...
Galion	6,859	10	17.50	...	2	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	6	2	...	...	1	...	2	...	...	1	1	2	...
Gallipolis	4 568	12	31.52	1	2	4	1	...	...	...	...	1	...	...	...	...	...	...	...	1	...	1	5	...	...	...	...	...	...	...	...	3	2	...	...
Greenville	7,478	7	11.23	...	...	2	...	...	...	...	1	...	...	...	...	...	...	1	...	1	...	1	3	...	...	...	2	...	1	...	...	...	...	1	1
Kenton	7,091	6	10.15	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	2	1	1	2	...	...	...	...	...	2	...	...	...	...	1	...
Lancaster	8 130	11	16.24	1	...	3	...	...	...	...	1	1	...	...	...	...	...	1	...	7	...	7	1	1	...	...	...	...	...	...	...	...	...	...	...
Marietta	11,111	9	9.72	...	3	5	1	...	...	...	...	...	...	...	...	...	...	2	1	...	...	...	4	...	...	...	...	1	...	2	...	1	...	...	...
Marion	11.163	14	11.86	...	...	2	...	...	...	...	...	...	...	...	1	...	1	...	...	2	...	...	3	...	...	...	...	...	1	...	...	...	2	3	2
*Martin's Ferry	8 823	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Middletown	11 102	8	8 65	...	...	3	...	...	...	...	...	...	...	...	1	...	...	1	...	...	...	...	4	...	1	...	...	...	2	...	...	1	...	1	...
Mt. Vernon	6.639	5	9.01	...	...	1	...	...	...	...	...	...	...	...	1	...	...	...	...	2	...	1	1	1	...	...	...	...	...	...	...	...	1	...	...
Norwalk	8. 164	3	4.25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	2	1	...	...	...	...	1	...	...	...	...	...	...
Piqua	12.114	12	11.90	2	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5	1	4	4	2	...	...	1	...	1	...	...	...	2	...	...
*Pomeroy	4.219	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Salem	7.125	7	11.31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	7	2	3	...	...	...	...	1	...	1	...	...	...
Troy	5,051	5	11.85	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4	...	...	...	...	...	1	3	...	...	...	1	...
Urbana	6,696	7	12.55	1	1	1	1	...	...	...	...	...	...	...	...	...	...	...	...	2	...	2	2	1	...	...	...	1	...	...	...	...	2	...	1
Warren	8,075	5	7.43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5	3	...	...	1	...	1	...	...	...	...	...	...
Washington C. H.	7.668	6	9.40	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	5	...	...	...	...	...	...	...	...	...	...	...	...
Wellston	12 733	3	2.83	1	2	2	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	...	...	...	...	...	1
Wellsville	7,142	4	6 70	...	3	3	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	1	...	...	...	1	...	...	...	...	...	...	...	1
Wooster	5 944	7	14.13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	6	...	3	1	...	1	...	...	...	1	...	...	...
*Xenia	7,499	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Totals	223,063	193	10.38	10	18	32	5	...	1	...	2	2	...	...	3	1	1	10	1	36	6	25	99	16	8	2	8	5	17	8	1	19	12	10	9

*No report received. Not included.

†Abstract of the Reports of Deaths, and their Causes, in the Following Cities of Ohio, during the Year Ending October 31, 1897.

Cities of 10,000 inhabitants (census 1890) or over.	Population (estimated).	Total deaths, all causes.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total zymotic diseases.	Croup and diphtheria.	Cholera infantum.	Cerebro-spinal meningitis.	Cholera morbus.	Diarrheal diseases.	Dysentery.	Malarial fever.	Measles.	Puerperal fever.	Scarlet fever.	Tonsilitis.	Typhoid fever.	Whooping cough.	Total constitutional diseases.	Cancer.	Phthisis pulmonalis.	Total local diseases.	Apoplexia.	Bright's disease.	Bronchitis.	Convulsions.	Gastritis and peritonitis.	Heart disease.	Meningitis.	Pleurisy.	Pneumonia.	Total developmental diseases.	Total violence.	Premature and still births.
Akron	39,545	413	11.20	93	39	76	6	29	2	.....	3	2	2	...	2	...	...	6	5	89	29	37	193	40	19	6	10	10	30	20	2	31	48	37	46
Canton	44,556	281	6.38	59	35	61	12	20	.....	......	2	2	...	...	...	...	...	20	3	44	12	29	85	9	3	2	12	8	16	13	......	12	92	2	......
Chillicothe	11 539	210	18.20	· 33	23	28	11	7	......	.....	......	.....	1	...	1	1	1	11	...	36	6	26	104	5	6	1	5	3	19	13	.....	12	29	3	19
Cincinnati	341,298	5.402	15.69	999	556	699	142	66	14	5	61	24	11	18	8	16	3	101	34	1140	182	675	2895	140	76	236	106	155	309	237	8	511	543	287	527
Cleveland	373,600	4,949	13.25	1404	538	732	131	282	16	11	19	22	12	8	5	20	3	73	25	894	113	436	1892	102	62	116	407	149	288	190	10	435	1181	247	461
Columbus	128,153	1,222	9 51	204	114	168	18	62	5	......	5	7	3	2	1	6	...	29	1	290	72	201	629	58	31	10	20	38	72	35	2	92	59	76	74
Dayton	84.426	1,119	13.25	231	119	231	22	38	28	2	1	37	2	...	...	2	...	18	3	250	54	161	492	17	11	9	21	23	100	23	.. ...	56	79	64	105
E. Liverpool	17,595	151	8.75	27	25	26	5	......	......	......	....	2	1	6	...	...	...	9	3	18	3	14	49	1	2	1	6	3	13	7	......	16	3	3	1
Findlay	20,000	193	9.65	34	13	37	4	10	....	...	3	1	4	...	1	1	...	8	....	42	6	30	85	7	8	2	2	2	18	3	......	7	14	15	36
Hamilton	22,771	328	14.40	46	17	85	8	......	2	6	11	6	4	...	6	2	...	3	10	65	13	43	108	15	18	8	3	10	31	8	....	13	53	10	17
Ironton	12,681	180	14.19	26	25	33	6	3	....	......	3	5	..	...	1	...	. .	12	1	35	8	17	61	4	5	6	2	4	5	6	1	13	42	6	8
Lima	26 966	414	16.46	61	41	104	17	34	3	......	15	8	4	...	5	1	...	6	3	45	10	34	103	4	4	1	3	5	53	6	......	19	12	20	28
Mansfield	16,765	187	11.15	23	20	35	14	5	3	.....	....	...	2	...	...	...	...	5	...	34	5	22	91	7	3	3	5	4	22	1	1	6	19	6	12
Massillon	13.255	114	8.60	..	......	29	6	2	.....	......	......	...	...	...	...	...	...	6	2	25	4	13	44	4	1	1	4	4	5	1	....	2	12	3	......
Newark	18.833	223	11.81	47	13	35	10	10	2	......	2	....	..	...	..	...	2	3	... .	59	11	29	103	10	12	5	4	5	17	11	......	20	9	17	25
Portsmouth	13,205	238	18.02	44	25	50	11	4	6	1	......	......	...	..	...	...	...	10	.....	53	2	26	120	3	1	4	4	8	24	2	......	33	5	10	17
Sandusky	20,570	200	9.72	15	17	55	31	5	.....	......	......	....	...	1	4	...	...	5	1	25	5	17	56	2	4	6	8	3	22	1	.....	10	50	14	22
Springfield	43.121	452	10.48	54	71	89	21	10	4	......	2	6	1	11	3	3	...	11	13	63	17	44	228	25	21	14	10	17	44	15	1	22	50	22	40
*Steubenville	11,386	....	......	.....	......	......	.....	......	....	......	......	.....	...	...	...	...	...	..	.....	..		..	. ...	....	..	......	......	......	......	......	......	.....	......	. ...	....
Tiffin	13,169	152	11.29	23	5	19	....	8	3	..	.....	3	...	..	...	...	...	2	.	26	6	17	81	7	1	1	4	8	26	1	......	17	15	7	4
Toledo	114,352	1,523	13.32	390	130	272	23	69	19	3	14	4	8	10	3	4	1	37	5	232	41	137	637	13	24	34	85	40	80	22	......	90	263	212	212
Youngstown	56,810	463	8 15	102	62	117	5	27	....	3	11	.....	2	6	...	4	...	19	2	85	10	29	202	13	14	25	29	12	28	15	1	62	32	21	80
Zanesville	23,307	324	13 90	52	26	63	11	21	1	......	1	3	1	...	1	6	...	14	....	56	18	35	51	6	7	......	......	8	10	7	......	30	134	17	9
Totals	1 459,812	18,801	12.88	3970	1914	3057	517	712	107	31	156	132	61	62	41	66	10	411	111	3606	628	2075	8315	492	339	491	750	519	1232	637	26	1509	2777	1102	1743

*Reports incomplete. Not included. † Taken from annual reports.

*Abstract of the Reports of Deaths, and their Causes, in the Following Cities of Ohio, During the Year Ending December, 1897.

Cities of less than 10,000 inhabitants. (Census 1890).	Population (estimated).	Total deaths all causes.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total zymotic diseases.	Croup and diphtheria.	Cholera infantum.	Cerebro-spinal meningitis.	Cholera morbus.	Diarrhœal diseases.	Dysentery.	Malarial fevers.	Measles.	Puerperal fever.	Scarlet fever.	Tonsillitis.	Typhoid fever.	Whooping cough.	Total constitutional diseases.	Cancer.	Phthisis pulmonalis.	Total local diseases.	Apoplexia.	Bright's disease.	Bronchitis.	Convulsions.	Gastritis and peritonitis.	Heart disease.	Meningitis.	Pleurisy.	Pneumonia.	Total developmental diseases.	Total violence.	Premature and still births.
Alliance	10,758	93	8 61	18	10	15	5	3	......	...	...	...	...	...	1	2	...	...	...	15	5	10	61	......	1	.....	3	......	9	......	...	7	......	2	4
Bellaire	11 534	116	10 06	26	22	15	....	2	......	...	1	2	...	...	...	2	...	6	1	18	4	13	76	4	2	1	3	5	4	10	1	19	4	3	7
Bucyrus	8 117	68	8 35	......	.....	13	3	....	......	...	.	...	1	.	...	...	..	4	...	17	4	11	19	2	5	3	.....	......	3	......	...	6	12	7	5
Circleville	7,116	110	15.46	9	3	16	1	2	2	...	...	...	..	...	...	...	...	7	...	26	2	3	63	3	2	......	......	3	8	1	...	6	2	3	5
Defiance	9 257	43	4 64	4	1	16	2	6	......	...	...	...	...	1	...	4	...	3	...	9	......	6	18	......	3	2	......	3	4	5	...	1	.....	......	5
Delaware	9,304	89	9.57	11	5	8	......	1	......	...	...	3	...	...	...	...	...	3	...	23	6	16	39	4	2	2	2	4	8	2	...	9	17	2	9
Fostoria	11,408	95	8.33	11	4	21	...	5	......	...	1	2	1	1	...	...	2	4	1	22	3	12	38	6	6	1	.....	4	8	3	...	3	......	14	6
Fremont	6,343	61	9.62	6	......	10	4	2	1	...	...	1	...	..	...	...	1	1	...	14	2	6	21	3	1	1	1	1	3	1	...	2	5	5	......
Galion	6,859	60	8.75	3	3	13	1	....	1	...	1	...	...	...	...	...	...	2	1	14	2	8	26	5	.....	1	3	......	8	3	...	5	......	7	... .
Gallipolis	4,568	116	25.39	......		17	4	3	2	...	...	2	...	1	1	. .	...	2	1	22	1	13	65	1	....	1	2	2	11	......	...	18	......	3	9
Greenville	7,478	54	7.22	4	2	11	4	1	2	...	1	...	1	...	...	1	...	3	...	9	3	6	30	......	4	1	1	1	9	8	...	3	......	[illegible]	4
Kenton	7,091	65	9 17	......		9	6	3	......	...	...	...	...	...	...	...	...	...	...	22	8	11	13	......	.....	......	......	......	5	.....	...	8	17	2	.....
Lancaster	8,130	123	15.13	5	2	27	1	6	......	...	...	2	1	...	...	...	...	6	...	30	8	21	46	9	9	......	1	3	10	4	...	10	13	.....	3
Marietta	11 111	115	10 35	23	10	30	8	2	......	...	1	1	1	...	...	...	...	7	3	13	4	4	54	3	2	3	2	5	4	5	...	9	14	4	8
Marion	14,163	91	6.64	5	.....	21	3	6	4	...	...	...	...	...	1	...	1	4	...	19	1	......	31	1	2	......	......	2	5	3	...	1	2	11	5
Martin's Ferry	8,8 3	122	13 83	2	......	16	2	2	......	...	...	...	...	..	...	...	..	10	..	27	3	17	45	1	..... .	3	3	1	3	5	...	10	7	......	11
Middletown	11,102	98	8.83	11	5	10	......	1	2	...	4	1	...	...	...	...	...	2	...	19	4	13	64	10	3	2	1	9	13	7	...	11	.....	5	18
Mt. Vernon	6,639	75	11 30	5	3	6	......	1	.....	...	...	...	...	...	1	...	...	3	1	19	5	8	37	8	.....	......	2	... ..	14	..... .	...	5	8	5	3
Norwalk	8,464	89	10.52	15	5	31	9	6	3	...	1	2	...	...	...	...	..	...	...	25	10	12	25	4	4	......	......	3	7	2	...	3	......	3	.....
Piqua	12,114	152	12.55	16	11	24	18	4	......	...	...	...	...	...	...	...	...	2	...	42	9	24	57	4	3	......	6	3	11	5	1	5	18	11	.... .
Pomeroy	4,219	23	5.45	1	......	7	1	2	......	...	...	..	1	...	...	...	...	2	...	5	......	3	8	......	1	. ...	1	......	5	......	...	1	2	1	......
Salem	7,425	69	9.29	10	1	20	1	2	4	...	...	...	...	1	...	2	. .	4	...	15	4	4	32	9	5	1	.....	4	7	......	..	1	.....	2	14
Troy	5,051	77	15.24	1	1	9	1	1	.....	...	1	...	...	1	...	...	...	3	...	11	3	8	32	......	1	......	2	1	7	6	...	8	2	4	2
Urbana	6.696	83	12 40	13	10	15	4	1	2	...	1	1	...	..	...	1	...	...	...	23	1	20	30	3	2	2	3	2	10	......	...	3	11	4	3
Warren	8,075	83	10 28	14	5	8	... ..	3	......	1	2	...	1	..	...	...	...	1		19	1	13	51	4	2	2	1	1	8	4	...	19	......	2	3
Washington C. H.	7,668	110	14.35	20	10	31	......	3	......	...	3	1	1	...	...	..	...	1	4	36	3	23	31	1	3	1	......	2	4	3	...	13	4	6	12
Wellston	12,733	82	6.14	21	11	29	9	8	.....	...	1	1	4	...	...	...	...	1	2	16	2	13	18	......	...	1	3	2	3	2	...	3	6	5	8
Wellsville	7,142	88	12 32	22	9	21	7	2	1	...	...	1	...	...	...	1	...	3	...	24	3	10	36	3	.....	2	3	1	6	5	...	6	....	4	9
Wooster	5.911	85	14.30	4	......	5	1	.....	......	...	...	1	...	...	...	..	...	1	1	11	2	9	68	21	21	1	....	6	3	......	...	14	......	1	.....
Xenia	7,499	136	18.14	11	10	15	3	3	4	...	...	1	...	...	. .	...	..	1	1	47	7	28	61	5	6	......	2	8	22	.....	...	13	13	5	1
Totals	252.864	2,574	10.18	294	143	485	98	81	28	1	21	22	12	5	4	13	4	86	16	612	110	345	1195	114	90	31	48	76	222	84	2	222	157	122	154

*Taken from Annual Reports.

Abstract of the Report of Deaths, and their Causes, in the Following Villages of Ohio, During the Year of 1897.

262 Villages.	Population (estimated).	Total deaths, all causes.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total zymotic diseases.	Croup and diphtheria.	Cholera infantum.	Cerebro-spinal meningitis.	Cholera morbus.	Diarrhœal diseases.	Dysentery.	Malarial fevers.	Measles	Puerperal fever	Scarlet fever.	Tonsilitis.	Typhoid fever.	Whooping cough.	Total constitutional diseases.	Cancer.	Phthisis pulmonalis.	Total local diseases.	Apoplexia.	Bright's disease.	Bronchitis.	Convulsions.	Gastritis and peritonitis.	Heart disease.	Meningitis.	Pleurisy.	Pneumonia.	Total developmental diseases.	Total violence.	Premature and still births.
Aberdeen	866	8	9.25	1		3			1									2					5				1		1			3			
Ada	2 336	24	10.28		3	6	1	1	1							1		2		4		3	11		5				4	1				3	
Addystown	500	28	56.00	1	7	2												1	1	4	2	1	17	2	1	3			9			2		5	6
Alger	400	1	2.50			1	1																												
Antwerp	1 371	6	4.40			3					3									3		3													
Arcanum	1,476	36	24.40	2		8	3	2						2				1		15	2		15	10	3	4		1	8	5		11			3
Archbold	902	1	1.10																	1	1														
Arlington	600	12	20.00	6		5	1	2						1				1		5		3	2									2			
Ashley	754	13	17.20			2												1		4	1	3	3						1			2	3	1	
Ashtabula	12,950	130	10.04	36	9	20	2	9			5				1			2		18	7	9	56	9	6		4	1	13	4		18	14	22	12
Ashville	430	1	2.33																	1	1														
Athens	2,782	35	12.60	11	5	5		2	3											5		5	22	1	2			1	4	1		7		3	4
Bainbridge	825	25	30.30	3	2	4	1											3		4	1	3	12	2	1			3		3		1		5	2
Bakersville	275	4	14.60			1					1												3						1			2			5
Barberton	3,000	45	15.00	18	3	9	1	4	1		1							1		5		5	29	1			3		6	1		3		2	2
Barnesville	3,888	68	17.50																																
Barnhill	969	1	1.03																				1												
Beaver Dam	431	7	16 24	1		4		1				1				1				1	1		1			1									
Bedford	1 294	23	17.70	1	1	3	1		2											13	2	3	5						2			3		2	
Bellbrook	305	7	22.97	1																5	1	1	2						2						
Bellefontaine	4,126	80	18.08	7	17	15	3	1				5						4		21	1	18	44	5	5	2		10	13	3		1			7
Belmont	437	4	9.16			1								1						1	1		2									2			1
Bloom Centre	100	9	90.00	3		1		1												3		2	2	2									1	1	1
Bloomingburg	730	10	13.70			3												2					7	1					1		1				
Bloomville	810	7	8.61																	4	2	2	3						2			1			1
Bond Hill	1,000	13	13.00	3		1		1												4		1	7		2		2		1					1	3
Bowerston	1,000	16	16.00	2	3	9			1	1								2		2		1	4						2			2		1	1
Bowersville	400	4	10.00			1			1											2	1		1									1			
Bowling Green	6,121	8	1.31	2		4	1											3		3	1	2	1						1						
Bradford	1.600	18	11.25	2	3	2		2												4	1	3	11		1		1					1		1	
Bradner	1 100	18	16.36			4		3												5	1	4	8	1			4					1		1	
Bridgeport	4,277	43	10.06	6	2	9		1							1	1		3	1	9	3	5	19				2	2	2			4	5	1	1

Brooklyn	5,000	22	4 40	7	...	11	1	7	2	...	...	...	...	...	...	...	...	1	...	...	...	...	7	2	...	1	...	...	4	...	...	...	...	2	6
Bryan	3,151	33	10.47	2	1	3	1	1	...	...	...	...	...	...	...	...	...	...	...	18	3	8	4	1	...	...	...	...	3	...	...	...	3	3	...
Cadiz	1,891	24	12 70	...	5	5	...	1	...	...	1	1	...	...	...	...	...	...	...	5	1	4	13	...	2	...	...	1	5	...	...	...	1	...	3
Caldwell	2,078	2	.96	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	1	1	...	...	...	...	...	...	...	...	...	...	...
Caledonia	863	10	11.60	...	...	4	3	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	1	...	...	...	...	...	1	...	...	...	5	...	...
Cambridge	5,826	63	10.80	17	6	17	2	5	...	1	1	...	...	...	...	1	...	2	...	10	...	10	28	1	...	...	2	3	5	...	...	4	3	5	7
Canal Dover	4,761	1	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Canfield	693	8	11.55	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	7	3	...	...	...	...	2	...	...	1	...	...	...
Cardington	1,473	16	10.86	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Carey	2,029	15	7.39	2	2	4	...	1	1	...	...	...	1	...	1	...	...	...	...	4	...	...	4	...	1	...	...	1	...	...	...	2	2	1	1
Carrollton	1 296	10	7.72	...	...	3	3	...	...	...	...	...	...	...	...	...	...	...	...	4	...	3	3	...	...	...	...	...	2	...	...	1	...	...	4
Carthage	2,400	21	10.00	1	3	1	...	...	...	...	...	...	...	...	...	...	...	...	1	8	...	2	13	1	...	2	2	1	...	...	...	6	...	2	3
Cedarville	1,488	17	11.43	4	...	4	1	...	1	...	...	2	...	...	...	...	...	...	...	3	...	3	6	1	2	...	...	...	2	...	...	1	...	...	...
Celina	4,400	105	24.09	13	11	59	14	13	2	4	16	3	...	...	...	...	...	...	...	10	3	5	15	...	3	...	...	4	2	...	...	6	4	8	7
Centerburg	770	5	6.50	1	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	1	3	...	...	...	...	...	1	...	...	...	...	...	...
Clarington	670	1	1.50	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Clearport	150	7	46.66	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	2	2	...	4	2	...	...	...	...	...	...	...	1	...	...	1
Clyde	2,290	43	18.77	2	2	3	...	1	...	...	...	...	...	...	...	...	...	1	...	11	4	6	22	1	1	...	...	2	8	...	...	1	1	2	...
Collingwood	3,000	39	13.00	8	...	3	1	1	...	...	...	...	...	...	...	...	...	1	...	12	1	2	16	1	...	...	1	...	4	1	...	1	...	6	...
Columbiana	1,040	12	11.54	3	...	3	...	...	...	...	...	...	...	...	...	...	...	1	...	5	1	3	4	2	...	...	...	...	2	...	...	...	...	...	...
Commercial Point	500	2	4.00	2	...	2	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Conneaut	6,293	68	10.80	6	4	9	3	2	...	...	...	...	...	...	2	...	...	1	1	12	3	8	24	7	2	...	...	...	6	1	...	8	...	4	2
Continental	895	7	7.80	2	...	3	...	2	...	1	...	...	...	...	...	...	...	...	...	...	...	...	4	1	...	1	1	1	...	...	...	...	...	...	3
Convoy	701	15	21.30	1	3	4	1	2	...	...	1	...	...	...	...	...	...	...	...	1	...	1	2	...	...	...	...	...	1	...	...	1	7	1	3
Corning	5,273	31	5.88	4	2	12	...	1	4	...	...	...	...	...	...	...	...	3	...	4	2	2	9	2	...	...	...	...	2	...	...	2	...	5	1
Coshocton	4,186	56	13.38	4	2	3	...	...	...	...	...	...	...	...	...	1	...	...	...	8	1	7	35	3	2	...	...	3	5	2	...	5	10	...	4
Covington	2,012	24	11.75	...	...	4	...	...	...	...	1	...	...	1	...	...	...	...	...	5	1	3	12	1	...	...	...	1	5	1	...	2	1	1	1
Cridersville	698	5	7.16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	2	...	...	...	...	...	...	...	...	...	...	2	...	...
Cumberland	666	3	4.50	1	...	1	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	1	...	...	...	...	...	...	4
Cuyahoga Falls	2,864	30	10.50	1	...	6	...	2	...	...	1	1	1	...	...	...	1	...	...	8	1	6	15	...	1	...	...	...	2	...	...	2	...	1	1
Dalton	715	9	12.60	1	1	3	1	1	...	...	...	...	...	...	...	...	...	1	...	4	1	3	1	...	...	...	...	...	...	1	...	...	...	1	...
De Graff	1,161	8	6.90	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	2	...	2	2	...	...	...	...	...	...	...	...	1	...	3	...
Delphos	5,082	40	7.87	6	2	2	1	...	...	...	...	...	...	...	...	...	...	1	...	10	1	7	23	1	...	...	2	4	2	...	...	4	1	3	1
Dennison	4,629	30	6.50	3	7	4	...	3	...	...	...	...	...	...	...	...	...	...	...	9	...	4	12	1	...	...	1	1	2	...	...	2	...	5	1
Deroy	350	8	22.86	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4	...	4	4	...	1	...	...	...	...	...	...	1	...	...	5
Doylestown	1,199	9	7 50	3	...	2	1	...	...	...	...	...	...	...	...	...	...	...	...	3	...	2	5	...	...	...	1	1	2	...	...	...	...	...	...
Dunkirk	1,160	11	9.50	4	...	7	...	4	1	...	...	...	1	...	1	...	...	...	1	3	...	2	...	...	...	...	...	...	...	...	...	...	...	1	...
Dupont	1,203	7	5.82	1	1	2	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	...	...	...	1	...	...	...	...	1	2
East Fairfield	200	4	20.00	...	...	1	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	2	...	1	...	1	...	...	...	...	...	...	1	2
East Palestine	1,914	12	6.12	2	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	3	...	3	8	1	...	...	...	...	3	1	...	1	...	...	...
Eaton	3.655	80	21.90	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
El Dorado	385	2	5.19	1	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Elida	484	5	10.33	1	...	3	...	1	...	...	...	...	1	...	...	...	...	1	...	...	...	...	2	...	...	...	...	...	1	1	...	...	...	...	...
Elmore	1,318	1	...	...	...	1	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Elmwood Place	2,500	29	11.20	6	3	6	...	2	...	...	...	...	1	...	...	...	...	...	...	5	2	3	10	...	...	...	...	2	1	2	...	1	...	3	5
Fairport	1,000	30	30.00	...	...	3	...	2	...	...	1	...	...	...	...	...	...	...	...	4	...	2	19	...	...	...	4	...	4	4	...	3	...	4	3
Fairview	300	3	10 00	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
Fayette	1,202	10	8.32	1	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	4	1	...	4	1	...	...	...	1	1	...	...	...	...	...	1
Felicity	633	14	22 12	1	1	5	4	...	...	...	...	1	...	...	...	...	...	...	...	3	1	1	6	1	1	...	...	...	2	...	...	1	...	...	1
Fernbank	400	2	5.00	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	2	...	...	...	...	...	...	...	...	...	...	...
Flushing	720	10	13.90	3	...	2	1	1	...	...	...	...	...	...	...	...	...	...	...	4	2	...	4	...	...	...	...	1	3	...	...	...	...	...	...
Forest	1,234	7	5 67	...	...	3	...	1	...	...	...	...	...	...	1	...	...	1	...	2	1	1	2	1	1	...	...	...	...	...	...	...	...	...	...
Franklin	2,998	29	9 90	5	2	2	...	...	2	...	...	...	...	...	...	...	...	...	...	11	1	3	12	...	...	1	...	1	1	1	...	2	2	2	...
Fultonham	400	21	52.50	2	2	6	3	...	1	...	...	1	...	...	...	...	...	...	...	3	...	3	9	2	1	...	...	...	2	...	...	4	...	1	6

Abstracts of the Reports of Deaths and their Causes in the Following Villages of Ohio, During the Year 1897, Continued.

262 Villages.	Population (estimated.)	Total deaths, all causes.	Annual rate per 1,000.	Total under 1 year.	Total under five years and over one year.	Total zymotic diseases.	Croup and diphtheria.	Cholera infantum.	Cerebro-spinal meningitis.	Cholera morbus.	Diarrhœal diseases.	Dysentery.	Malarial fevers.	Measles.	Puerperal fever.	Scarlet fever.	Tonsillitis.	Typhoid fever.	Whooping cough.	Total constitutional diseases.	Cancer.	Phthisis pulmonalis.	Total local diseases.	Apoplexia.	Bright's disease.	Bronchitis.	Convulsions.	Gastritis and peritonitis.	Heart disease.	Meningitis.	Pleurisy.	Pneumonia.	Total developmental diseases.	Total violence.	Premature and still births.
Gambier	725	1	1.38	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...		...	...	...	...	...	...	...	...	...	...	...	...	...	...
Geneva	2,423	26	10.03	2	...	2	...	...	...	...	...	...	...	...	1	...	...	1	...	4	...	4	16	...	1	...	2	...	4	...	...	3	...	2	...
Germantown	1,322	16	12.10	...	...	6	1	...	1	...	...	1	...	...	...	...	...	1	...	3	...	1	7	1	...	...	...	...	4	...	...	2	...	...	3
Gilboa	249	3	12.05	..	1	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1	...	1	1
Girard	3,000	25	8.33	6	1	5	...	4	...	...	...		...	...	...	...	...	...	...	5	1	1	12	...	2	...	...	...	3	...	...	1	3	2	2
Glendale	1,471	24	16.30	5	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	3	1	2	12	...	1	2	...	...	3	1	...	4	4	3	1
Glouster	2 500	25	10.00	2	...	11	2	...	...	...	...	...	...	...	1	2	...	6	...	2	...	2	9	...	...	...	...	...	1	...	...	4	...	1	...
Grafton	600	10	16.66	4	...	7	...	1	2	...	1	...	...	...	...	1	...	2	...	1	...	1	1	...	...	...	...	...	...	...	...	1	...	1	1
Grand Rapids	837	3	3.57	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	1	...	...	...	...	...	...	1	...	1	1
Green Camp	275	2	7.27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
Green Spring	1,072	12	11.10	4	1	3	...	1	2	...	...	...	...	...	...	...	...	...	...	3	...	3	0	2	...	...	1	1	1	...	...	1	...	...	...
Greenwich	1,093	6	5.50	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5	1	...	...	...	...	2	...	...	...	...	1	...
Hamden Junction	70[illegible]	8	11.35	2	1	3	2	...	...	...	...	...	...	...	...	...	...	1	...	1	...	1	2	...	...	...	...	...	1	...	...	...	...	...	...
Hamler	1,028	1	...	...	...	1	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Hanging Rock	1,023	7	6 84	...	...	4	3	...	...	...	...	...	...	...	...	...	...	1	...	1	...	1	2	...	...	...	...	...	1	1	...	...	...	...	...
Hartwell	2,175	18	8.28	3	1	2	...	...	...	...	...	...	...	...	...	...	...	2	...	6	...	4	8	1	1	...	...	...	...	...	...	3	...	1	1
Hayesville	356	5	14.00	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	1	...	1	...	...	...	...	...	...	...	3	...	...
Hebron	370	8	21.68	2	3	1	...	...	1	...	...	...	...	...	...	...	...	...	...	3	1	2	4	1	...	1	...	...	...	...	...	2	...	...	2
Hicksville	3 186	9	2.82	1	...	3	...	1	...	...	...	...	...	...	...	...	...	2	...	3	...	3	3	...	...	...	...	...	1	...	...	1	...	...	...
Hilliards	300	3	10.00	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	1	1	1	...	...	...	...	...	...	...	...	...	...	...	1
Holgate	1,781	15	8 42	3	...	5	...	1	2	...	...	...	...	...	1	...	...	...	...	1	...	1	5	3	..	...	...	2	...	...	...	...	1	3	...
Hallansburgh	450	8	17.77	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	2	...	2	5	...	1	2	...	...	...	2	...	...	...	...	4
Hoytville	395	5	12.66	...	...	5	...	...	...	...	...	...	...	...	...	...	...	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Hudson	1,143	17	14.87	2	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	3	2	1	5	...	1	...	...	1	2	...	...	1	6	1	1
Huntsville	556	7	12.60	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4	2	2	3	1	...	...	1	...	1	...	...	...	...	...	2
Hyde Park	400	8	20.00	...	...		...	...	...	...	...	...	...	...	...	...	...	...	...	5	1	3	1	...	...	...	...	...	1	...	...	...	...	1	...
Jackson	5,518	68	12.26	6	...	21	2	6	3	...	...	...	...	...	...	1	...	8	1	12	5	6	23	...	2	...	...	6	9	1	3	2	5	6	3
Jacksonville	727	13	17.88	2	...	9	...	...	3	..	1	1	...	1	...	...	...	3	...	2	...	2	1	...	...	...	...	...	1	...	...	...	...	1	2
Junction City	394	1	2.54	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1
Kent	3,641	54	14.83	3	1	6	...	3	...	...	...	...	...	...	...	...	...	3	...	18	4	7	18	...	1	2	3	1	1	1	...	1	8	4	1
Killbuck	500	1	2,00	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...
Kimbolton	261	4	15 32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	1	1	2	1	...	...	...	...	1	...	...	...	...	...	...
Larue	1,284	6	4 68	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	4	...	...	...	...	...	...	1	...	...	...	...	...

Lebanon	3,319	63	18.90	4	4	8	1		1			3	1							22		6	31					1	4	2		1		2	1
Leesburg	349	2	5.73		1	1			1											1		1													
Leetonia	3,035	37	12.19	2	7	7	1	1				1				3		1		7	4	3	14	2				2	3	1		4	5	4	4
Lewisburg	548	5	9.11			1					1									2		2	2		1				1						2
Lexington	385	13	33.77	1																6	3	3	5	3					1	1					
Liberty Centre	497	7	13.08			1			1											1			2		1								3		
Lockington	300	2	6.66																				2	1	1										
Lockland	2,993	29	9.90	2		14		2			1		1		2				1	2		1	11		1		1		3	2		4			2
Logan	3,518	47	13.36	3		6		1				2			1			2		30	1	9	9			1		5				3		2	
London	3,496	72	20.59																																
Lorain	10,612	115	10.84	41	13	25	11	6		1						1		4	1	15	11	4	43	8	2	1	4	3	2	2		13	17	15	9
Loudonville	1,408	29	20.60	2	1	5	2	1										2		5		4	7		1			1	3			2			
Louisville	1,555	17	10.93	5	2	8		4							1			1		1		1	7	1	1	1	1	1	1	1				1	
Lowell	750	1	1.80																																1
Laurelville	726	5	6.87	1		2		1															1									1		2	1
Lynchburg	840	7	8.33																				7	1					2	1		1			
McConnellsville	2,014	29	14.40			1			1											18	1	9	10						7			1			3
McGuffey	300	1	3.33	1		1		1																											3
Madison	701	3	4.28																	2	1	1	1												1
Magnolia	375	4	10.66	1																2		1											2		5
Manchester	2,425	24	9.98	3		7	1	3					2					1		7		6	8	1	2		1		2					2	
Marblehead	500	5	10.00			5										5																			
Marshallville	359	2	5.57																	1		1	1		1										
Martinsville	323	3	9.30			1	1																2	2											
Marysville	3,491	36	10.31	2	1	5	1				3							1		4	1	2	25	5				1	7	4		4	2		
Mason	680	11	16.20			1														1	1		9	2			1	1		1		1			
Mechanicsburg	1,416	47	33.20	4	6	16	1	1				1						3	2	15	2	9	15	1	1				5	2		5		2	3
Melrose	430	7	16.28			7							3				4																		
Mentor	477	10	20.97	2	1															2		2	4						1			3	1	2	
Miamisburg	3,966	38	9.60	7	1	3					1	1						1		15	1	8	12		1		1	1	4	4		1	8		
Middleport	3 342	47	11.06	9		13	10											3		26	1	17	7		1				6					1	
Midland City	328	6	18.31			4	3													1		1	1				1								1
Milford	1,233	13	10.51	1	2	1		1												4	1	3	6					2				1	1	1	3
Middlesburg	2,003	26	12.98	5	2	4		1	2										1	5		3	16	1					3	4		3		1	1
Mineral Ridge	689	9	13.06		1	2		1										1		2		2	4	1	1				2						
Mingo Junction	2,408	20	8.31	2	2	5	1								1			2	1	5	1		5		1							1		5	3
Montpelier	2,909	15	5.16		5	5		4										1		5	2	3	5	2					1			2			7
Morristown	332	1	3.01																				1					1							
Morrow	776	30	39.95																																
Mt. Blanchard	553	1	1.80																	1		1													
Mt. Pleasant	611	11	18 00			3	2													3		3	4						3		1		1		4
Mt. Sterling	1,026	7	6.82			5		1							1			3		1		1												1	
Mt. Victory	689	13	18.87			2												2		6	1	5	5	2											
Murray City	2,518	10	3.97	3	2	2												2		3	1	2													5
Napoleon	2,591	34	13.12	2		4		1	1							1		1		11	2	4	15	4		2	1	1	5			2		2	
Navarre	1,123	8	7.12			4	4																4	2			1		1						1
Nelsonville	5,976	39	6.53	6	5	11	1	3							1			2		6	2	3	16	7				1	5	2		1	1	5	4
Nevada	670	8	11.93	1		1														3		2	1						1				1	1	5
New Bremen	1,290	6	4.65			2							1					1		2	1	1	2	1						1					
New Carlisle	1,070	5	4.67			1	1													2		2	1				1								2
New Concord	909	5	5.50			1												1		2		2	2						2						
New Holland	733	11	15.00			2					2									1		1	7						1						
New London	1,159	21	18.12	3	1	4	2	2												1		1	15		1			2	8	1		1		1	2
New Matamoras	563	4	7.10			2	2													1														1	

Abstract of the Reports of Deaths, and their Causes, in the Following Villages of Ohio, for the Year 1897—Continued.

262 Villages.	Population (estimated.)	Total deaths, all causes.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total zymotic diseases.	Croup and diphtheria.	Cholera infantum.	Cerebro-spinal meningitis.	Cholera morbus.	Diarrhœal diseases.	Dysentery.	Malarial fevers.	Measles.	Puerperal fever.	Scarlet fever.	Tonsillitis.	Typhoid fever.	Whooping cough.	Total constitutional diseases.	Cancer.	Phthisis pulmonalis.	Total local diseases.	Appoplexia.	Bright's disease.	Bronchitis.	Convulsions.	Gastritis and peritonitis.	Heart disease.	Meningitis.	Pleurisy.	Pneumonia.	Total developmental diseases.	Total violence.	Premature and still births.
New Madison	437	1	2.29						1														1									1			2
New Paris	846	11	13.00			1			1											1			2		2								3	2	
New Philadelphia	5,783	60	10.38	4	6	12	1	2	1			2						2		8	4	4	40	9	4	1		5	4	1		7			
New Richmond	2,269	10	4.41			3		1												3	1	2	4		1					2		1			
New Straitsville	2,782	27	9 90	3	5	2	1	1												2	1	1	13	1	2	1	4		2	1		2		2	5
New Vienna	926	7	7.56	1		1							1							1	1		4						1				1		
New Washington	725	2	2.76			2												2																	
Niles	4,601	91	19.80																																
North Amherst	1.726	12	6.95																																
North Lewiston	839	9	10.73	1		4			1											4		2	1									1			
Norwood	7,500	60	8.00	9	9	7	3	1			2									13	1	5	30	1	1	4		4	6	6		6	7	3	5
Oak Harbor	2,440	9	3.70																	2	1	1	4					1	1			1	1	1	
Oak Hill	661	10	15.06	1	2	3	1	1												4		2	3									3			
Oakwood	600	9	15.00			3	1								1			1		2		2	1	1											2
Oberlin	5,397	58	10.75	3	2	7												3	2	9	2	7	41	1	2					1		1		1	
Ohio City	666	14	21.02			6	2	1				1								3		3	4			1	1					1			1
Olmsted Falls	304	6	19.90	1	1															3	1	1	2						1						
Orrville	2,034	4	2.00																	1		1	2						2					1	
Ottawa	1,978	16	8.09	2		4												2		7		3	4			1		1	1	1				1	
Painesville	5,521	84	15.21	5	5	10		1							1	1		2	1	13	3	8	36	3	2		1	2	5			9	11	13	2
Pataskala	800	7	8.75																	3	1	2	4	2	1				1						
Patterson	181	1	5.55																				1	1											
Payne	1,146	1				1													1																
Pioneer	505	9	17.80		1															5		3	3		1			1					1		
Pleasant Hill	567	6	10.60	1		2	1													2	1		2												1
Pleasant Ridge	1,027	14	13 63	2	1	1														6		3	6				2		1			1		1	
Pleasantville	711	2	2.81	1																			1	1											
Plymouth	1,124	13	11.60	2	1	3		2		1													8	1			1		5					2	3
Poland	353	4	11.34		1																		4	2			1		1						2
Port Washington	405	3	7.40			3	1								1																				3
Powhatan Point	700	5	7.14																	3		3	1						1				1		1
Proctorville	560	10	18.00			4	1				1	1								1	1		3				1	1	1				1	1	2
Prospect	1,041	29	27.86	2	4	4	1								1			1		6	2	2	12		2				6	1		2	1	3	1

Put-in-Bay	228	1	4.39			1												1																	1
Ravenna	3,150	21	6.96	2	1	7	1	1		1					1	1		2		2	2		10	5	2		1					2	2	3	
Rawson	748	4	5.35			2												1		1			1									1			
Reading	3,438	37	10.76	9	3	8		5	1			2								9		9	16	2		2			8	2		2		2	2
Ridgeway	307	5	16.29		1	1	1																1						1	1		2			
Rochester	205	16	78.05																				11	1	3			1	4				5		
Rocky Ridge	483	1	2.07			1								1																					
Rogers	300	3	10.00																				3												
Rushville	346	10	28.90			1	1											1		1		1	5	2				1				2			
Sabina	1,385	29	20.93	4		2		1					1							7	1	6	4				1		1			1	16		
St. Bernard	2,622	50	19.07			22	11	6										3		5	2	3	18		1		2	6		2		7		5	8
St. Mary's	4,383	57	13.00																																
St. Paris	1,178	11	9.90	1		1								1						9	1	2											1		
Salesville	318	5	15.72			3			1								1	1		2		1													
Salineville	2,417	33	13.65	3	4	14	5	2				1		2				2		3	1	2	14	1	2		1	1	2			4		2	3
Scott	733	6	8.18		2	2	1	1															4		2				1						3
Shawnee	3,665	36	9.90	4	5	7		6								1				10	4	6	5		1		1	1				2	8	6	1
Shelby	2,054	47	22.90	9	2	10	4	1										3		17	2	6	17	2	2			1	3	2		1		3	5
Sherwood	1,105	3	2.71	1		2		1										1		1															
Sidney	5,571	48	8.62		2	12	3		1						1			1		17	4	8	17	1	6	1		1	7			1		2	2
Smithville	141	3	6.80																	1		1	1						1					1	
Somerset	1,074	6	5.60		3	2			1									1		1		1	3				1								
Somerville	304	7	23.05	1		2									1					2		2	3						2						
South Bloomfield	252	4	15.90		1	2	1									1							2			1									
South Charleston	1,124	7	6.23			4		1	1				1					1		2		2	1									1			
Sugar Grove	285	3	10.53																	1			2	2											1
Sycamore	1,129	4	2.80																				4	1					1			2			
Sylvania	560	6	17.11																	3	1	2	3	1	1			1							
Thornville	539	2	3.71			1										1							1	1											
Tippecanoe City	1,502	16	10.65	1		2	1					1								2	1	1	11	1				3	5				1		1
Toronto	5,000	45	9.00	5	8	21	2	3	3					3				8		5		4	18	2	1		3	1	3	1		4		1	3
Tuscarawas	500	4	8.00																	1	1		2	2										1	
Uhrichsville	4,806	55	11.44	11	6	10	1	3			2	1		2		1				10	1	7	33	1	3	1		4	7	3		7		2	9
Union City	1,423	18	12.65	4	1	4		2				1						1		4	1	3	8	2		1	2	1	1			1	1	1	2
Utica	808	5	6.20																				4						4						1
Vanlue	343	8	23.32	1		5	1	2										2		1		1	2												5
Versailles	1,565	30	19.10	5	5	7		1			4									12	4	5	11	1					2	1					1
Wadsworth	1,882	13	6.91			4			1		1									5	1	3	4						3			1			2
Wapakoneta	4,363	54	12.38	6	2	8		2	1		1							1		18	4	9	21	1	2	1	3	2	3					4	1
Waverly	1,551	55	35.46		7	5	2	1			1									10		5	33			1	1	1	6					2	3
Waynesville	617	23	35.55	3	1															8		5	11		1		1	2	3	1			1	3	
Wellington	2,271	20	8.81	2																1		1	15	1	3				11				1	1	
West Alexandria	457	5	10.94			1											1			2	1		2		2										
Western Star	250	1	4.00																				1	1											
Westerville	1,472	16	10.87			3						3								2	1		10	2	1			1	3	1		2		1	1
West Manchester	300	8	16.66		3	3		1	2											2	1	1	2	1						1			1		1
West Milton	881	10	11.35	1	2	3		2				1											2					1					4		1
Whitehouse	476	4	8.40																	3	1	2	1									1			
Williamsport	412	5	12.13		2	3		1															2							1		1			
Willoughby	1,399	35	25.02			1	1													4	2	2	11	1					7			3		1	

Abstract of the Reports of Deaths, and their Causes, in the Following Villages of Ohio, during the Year 1898—Concluded.

Villages.	Population (estimated.)	Total deaths, all causes.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total zymotic diseases.	Croup and diphtheria.	Cholera infantum.	Cerebro-spinal meningitis.	Cholera morbus.	Diarrhoeal diseases.	Dysentery.	Malarial fever.	Measles	Puerperal fever.	Scarlet fever.	Tonsillitis.	Typhoid fever.	Whooping cough.	Total constitutional diseases.	Cancer.	Phthisis pulmonalis.	Total local diseases.	Apoplexia.	Bright's disease.	Bronchitis.	Convulsions.	Gastritis and peritonitis.	Heart disease.	Meningitis.	Pleurisy.	Pneumonia.	Total developmental diseases.	Total violence.	Premature and still births.
Wilmington	3,336	59	17.68	5	2	6	......	......	..	...	1	1	...	...	...	...	...	2	...	21	8	13	25	3	2	...	1	......	11	2	...	4	4	3	4
Windham	900	4	4.44	......	......	. ...	......	......	...	...	...	...	...	...	...	...	...	......	...	2	1	1	2	......	1	...	...	......	......	......	...	.....	......	......	......
Winton Place	1,200	17	14.17	......	......	4	.....	2	2	...	...	...	...	..	...	...	...	......	...	2	......	2	9	2	1	1	...	1	.....	......	...	3	......	2	1
Woodstock	310	1	3.20	......	....	......	......	......	...	...	...	...	...	...	...	...	...	......	...	1	......	......	....	......	.....	...	...	......	......	......	...	......	......	......	......
Wyoming	1,700	14	8.24	......	......	......	......	......	...	...	...	...	...	...	...	...	...	.....	...	1	1	......	11	......	......	2	1	1	2	1	...	1	2	......	3
Zoar	250	5	20.00	......	....	......	.....	......	...	...	..	...	...	...	...	...	..	......	...	2	......	2	3	1	......	...	...	......	1	......	...	1	......	.....	. ....
Totals	429,105	4,837	11.28	509	285	944	163	197	72	10	55	42	16	17	26	26	7	164	17	1,004	189	552	1,855	197	129	46	82	127	422	101	6	310	310	279	321

Summary of Mortality Reports.

The total number of deaths reported from all causes—excluding premature and still-births—by the towns represented in the foregoing tables was 26,215. The average estimated population of the cities and towns represented was 21,41,781, which is equal to an annual death rate of 12.24 per thousand living population represented.

The deaths in 1,753,992 living population (estimated) in 1896 were 23,794, equal to an annual death rate of 13.57 per thousand; while in 1895 the total number of deaths reported in 1,406,434 population (estimated) was 24,717, equal to a mortality rate of 17.58 per thousand.

ZYMOTIC DISEASES.

DEATHS OF CHILDREN UNDER FIVE YEARS OF AGE.

The number of deaths reported of children under five years of age (permature and still-born excluded), was 7,115, which is equal to 27 per cent. of the deaths from all causes, and a death rate of 3 32 per thousand population represented. The death rate of children under five the preceding year was 3.87 per thousand population represented.

The total number of deaths reported from zymotic diseases was 4,486, which is equal to 17 per cent. of the deaths reported from all causes, and an annual rate of 2.1 per thousand of the population represented.

The number of deaths reported the preceding year from zymotic diseases was 4,722, equal to a death rate of 2.7 per thousand population represented.

CROUP AND DIPHTHERIA.

The total number of deaths reported from croup and diphtheria was 778, which is equal to 2.9 per cent. of the deaths reported from all causes, and a death rate of .3 per thousand of the population represented.

The number of deaths reported the preceding year from these causes was 1,167, equal to a mortality rate of .7 per thousand of the population represented.

CHOLERA INFANTUM, CHOLERA MORBUS AND DIARRHŒA.

The total number of deaths reported from cholera infantum, cholera morbus and diarrhœa was 1,064, which is equal to 4.06 per cent. of the deaths reported from all causes, and a mortality rate of .5 per thousand population represented.

The number of deaths reported the preceding year from these causes was 1,088, which is equal to a mortality rate of .62 per thousand of the population represented.

MEASLES, SCARLET FEVER AND WHOOPING COUGH.

The total number of deaths reported from measles, scarlet fever and whooping cough was 333, which is equal to 1.3 per cent. of the total number of deaths reported from all causes, and a mortality rate of .15 per thousand of the population represented.

The total number of deaths reported from these diseases during the preceding year was 308, equal to a mortality rate of .18 per thousand population represented.

TYPHOID FEVER.

The total number of deaths reported from typhoid fever was 661, which is equal to 2.5 per cent. of the total number reported from all causes, and a mortality rate of .39 per thousand population represented.

The number of deaths reported from this cause the preceding year was 767, equal to mortality rate of .44 per thousand living population represented.

CONSTITUTIONAL DISEASES.

The total number of deaths reported from constitutional diseases was 5,222, which is equal to 19.9 per cent. of the deaths reported from all causes, and a mortality rate of 2.4 per thousand population represented.

The number of deaths reported from constitutional diseases the preceding year was 4193, equal to a mortality rate of 2.4 per thousand population represented.

CANCER.

The total number of deaths reported from cancer was 927, which is equal to 3.5 per cent. of the deaths reported from all causes, and a mortality rate of .43 per thousand population represented.

The number of deaths reported from this cause the preceding year was 745, equal to a mortality rate of .42 per thousand population represented.

CONSUMPTION.

The total number of deaths reported from consumption was 2,972, which is equal to 11.34 per cent. of the deaths reported from all causes, and a mortality rate of 1.40 per thousand population represented.

The number of deaths reported from this cause the preceding year was 2,637, equal to a mortality rate of 1.50 per thousand population represented.

LOCAL DISEASES.

The total number of deaths reported from all local diseases was 11,365, which is equal to 43.4 per cent. of the deaths reported from all causes, and a mortality rate of 5.3 per thousand population represented.

The number of deaths reported from all local diseases the preceding year was 10,074, equal to a mortality rate of 5.74 per thousand population represented.

BRONCHITIS, PLEURISY AND PNEUMONIA.

The total number of deaths reported from bronchitis, pleurisy and pneumonia was 2,643, which is equal to 10.08 per cent. of the deaths reported from all causes, and a mortality rate of 1.24 per thousand of the population represented.

In the preceding year there were 2,476 deaths reported from these causes, equal to a mortality rate of 1.41 per thousand population represented.

CONVULSIONS AND MENINGITIS.

The total number of deaths reported from convulsions and meningitis was 1,702, which is equal to 6.5 per cent. of the deaths reported from all causes, and a mortality rate of .79 per thousand population represented.

The number of deaths reported from these diseases the preceding year was 1,664, equal to a mortality rate of .94 per thousand population represented.

DEVELOPMENTAL DISEASES.

The total number of deaths from developmental diseases reported (excluding premature and still-births) was 3,144, which is equal to 11.99 per cent. of the deaths reported from all causes, and a mortality rate of 1.5 per thousand population represented. During the preceding year there were 2,106 deaths reported from developmental diseases, equal to a mortality rate of 1.2 per thousand population represented.

VIOLENCE.

The total number of deaths reported from violence was 1,503, which is equal to 5.7 per cent. of the deaths reported from all causes, and a mortality rate of .7 per thousand population represented.

During the preceding year there were 1,236 deaths reported from violence, equal to a mortality rate of .71 per thousand population represented.

PREMATURE AND STILL-BIRTHS.

The total number of premature and still-births reported was 2,221 which is equal to 8.5 per cent. of the deaths reported from all causes, and a rate of 1.04 per thousand population represented.

During the preceding year there were 1,942 premature and still-births reported, equal to a rate of 1.11 per thousand population represented.

APPENDIX.

Proceedings of Eighth Annnal Meeting

OF THE

STATE BOARD OF HEALTH

AND

Local Boards of Health of Ohio

HELD IN

Columbus, O., Jan. 20 and 21,

1898.

REPORT OF THE PROCEEDINGS

of the

Eighth Annual Meeting

of the

State and Local Boards of Health of Ohio

held at

Columbus, Ohio, January 19 and 20, 1898.

The convention was called to order at one o'clock P. M., Thursday, November 19th, at the Y. M. C. A. Auditorium, by the President, Dr. T. C. Hoover, of Columbus, Ohio, (about 350 delegates being in attendance,) who said:

GENTLEMEN—I have the honor, as the representative of the State Board of Health, to welcome you to this meeting and express our gratitude that so many of you are present. Seven years ago I had a similar honor, and at that time took occasion to review somewhat briefly the work of the Board from its existence. As many of you perhaps are aware this Board was organized by legislative action in 1886. The sanitary laws of the state, however, were very incomplete and many of them were inoperative I notice by referring to the proceedings of the convention held in 1891, that I made the statement at that meeting, that prior to that year there had existed in Ohio less than thirty working boards of health. Until 1890 there was no compulsion about the organization or appointment of local boards of health. In that year we succeeded in having legislation enacted which required all municipalities of 500 inhabitants or more to appoint and organize local health boards. In 1893 the law was again amended so as to require a board of health in each municipality, and making the township trustees boards of health in each township.

I shall take only a few minutes of the time to call your attention to what has been accomplished since the enactment of that law. At the present time in the State of Ohio we have 685 municipal boards and 1,371 township boards engaged in sanitary work throughout the state. Not including township health officers or sanitary police, there are 11,649 men connected with health boards in the state. We feel that we are to be congratulated in having such a large army of sanitary soldiers always looking out for the health interests of the state.

The board has issued from time to time, as necessity required, circulars designed to instruct in the management of sanitary matters. We have issued since our organization the following circulars and manuals: The laws of Ohio relating to boards of health, published in pamphlet form; rules of the State Board of Health relating to plumbing; rules and regulations recommended for village boards of health; the same for township boards of health; instructions for dealing with cholera; instructions to railroads for dealing with cholera; circulars on the management of diphtheria and membranous croup, scarlet fever, typhoid fever, small-pox, glanders, consumption and on disinfection and disinfectants; also a circular on the care and management of infants and young children.

Many hundred thousands of these circulars have been distributed and many are being distributed as they are asked for. We always have a supply of them on hand, and we desire that it should be understood by local boards of health and health officers that such circulars will be cheerfully and gladly sent whenever a desire for them is made known.

The law that was enacted in 1893 accomplished several things. In the first place it was designated to better define the duties and powers of the State Board of Health as well as local health authorities. In addition to this it extended the scope of the work that had been placed in the hands of the State Board. We were given under that law the control or management of water supplies and sewers. That law provided that no city or village should introduce sewerage or water works or change the source of water supplies or outlet of sewers then in use, without the approval of the State Board of Health. This at first seemed a small matter, but the work has grown wonderfully. Since that time we have had referred to us questions concerning the building of new water works or the extension of old in sixty-seven of the different cities and towns of the state, as follows:

Ashland,
Ashtabula,
Attica,
Bucyrus,
Bowling Green,
Bluffton,
Blanchester,
Blind Asylum, Columbus,
Cadiz,
Caldwell,
Canal Dover,
Canton,
Elyria,
Fostoria,
Gibsonburg,
Greenwich,
Gallipolis,
Gallipolis Hospital,
Hiram,
Lancaster,
Lima,
Louisville,
Lebanon,
Logan,
Monroeville,
Norwalk,
Napoleon,
Osborn,
Oxford,
Painesville,
Port Clinton,
Rockford,
Ripley,
Sabina,
Salem,
Salineville,

Celina,
Cincinnati.
Cleveland,
Columbus,
Columbiana,
Cambridge,
Chagrin Falls,
Dalton,
Delaware,
Delphos,
Lorain,
Loveland,
Lynchburg,
Montpelier,
Mineral Point,
Mt. Sterling,
Mt. Vernon,
Millersburg,
Marion,
Medina,
Shelby,
Sidney,
St. Bernard,
St. Marys,
Tippecanoe City,
West Alexandria,
Wauseon,
Wapakoneta,
Wellington,
Wooster,
Xenia.

The State Board at Health has acted upon plans for sewerage or sewage disposal of the following places:

Alliance,
Ashtabula,
Athens,
Ashland,
Bluffton,
Bryan,
Bucyrus,
Cambridge,
Canton,
Cleveland,
Cincinnati,
Chillicothe,
Dayton,
Delaware,
Delaware County Jail,
Delphos,
East Cleveland,
Evanston,
Epileptic Hospital,
Fostoria,
Fairmount Children's Home,
Galion,
Greenville,
Glenville,
Hamilton,
Hyde Park,
Hardin County Infirmary,
Logan,
Lorain,
Miami University (Oxford),
Marietta,
Marysville,
Martin's Ferry,
Millersburg,
Middletown,
Mt. Vernon,
Marion,
Niles,
Oberlin,
Spencerville,
Salem,
State Reformatory,
Sidney,
Shelby,
St. Marys,
Shepardson College, Granville.
Toledo,
Toledo State Hospital,
Tippecanoe City,
Warren,
Wyoming,
Willoughby,
Zanesville.

The value and importance of work of this kind cannot be overestimated. All of you are familiar with the danger attending an impure or polluted water supply. All of you realize the disadvantage of imperfect or improper sewerage. Prior to the passage of the law of 1893, municipalities could construct waterworks and sewer systems upon any plan that was proposed without any sort of attention to the proper construction of the same, unless they were fortunate in securing a thoroughly competent and qualified engineer. Up to that time there were comparatively few qualified expert sanitary engineers in the state. Since the passage of that law we are very much gratified to know that there are numbers of them that have appeared in different parts of the state. The demand for proper knowledge in this direction has increased the number of men who have engaged in the work.

Now, the object of this convention, as you are all aware, is the better education of the men who are interested in sanitary work. It is our design to bring before this body, questions of common interest, to have them ably discussed by men of recognized ability in this line, and they will be open for discussion by the various members of local boards. We invite your co-operation, gentlemen. We hope you will feel free to participate in the work of the convention, and by so doing, make it as valuable as possible.

In order that we should economize all of the time that is possible, I want to say, that, after each paper is read, a certain amount of time, whatever may be necessary according to the importance of the subject, will be permitted for discussion, in which you are invited to participate. When you rise to discuss these questions or make any inquiries, we ask of you that you give your name and the place from which you come, so that we can make a record of it. It is our purpose to make a stenographic report of these proceedings and have it published in our records, and each of your bodies will receives copies of them after they are published.

Before taking my seat I would suggest, so we may proceed methodically, that there be some limit to the time of discussion. If we are permitted to go on without any limitation, perhaps more time may be consumed than we will have at our disposal, and I will therefore ask that a motion be made limiting the time for discussion to each one who desires to speak to a certain time.

Dr. J. F. Kirkpatrick, London: Mr. President, I move that the time allowed for each person to speak, be three minutes, unless a longer time be consented to by the house.

Mr. President: Permit me to suggest, that no one shall speak a second time, until all have had an opportunity to be heard.

Dr. Kirkpatrick: I accept the amendment.

Motion carried unanimously.

The President: The first paper on the program this morning is entitled "The Prevention of Milk Communicable Diseases," by C. A. Bonner, Health Officer, of Dayton, Ohio. Is Dr. Bonner in the room? (No response).

The President: The next paper is entitled "The Methods for the Examination of Milk," by Dr. Byron Stanton, of the State Board of Health. I have the pleasure, gentlemen, of introducing Dr. Stanton, of Cincinnati.

METHODS FOR THE EXAMINATION OF MILK.

By Byron Stanton, M. D.

It is not my intention to take up today the conditions which render milk harmful, but to consider some of the many methods of detecting sophistication of that fluid. This I do with the hope of being able to show the unreliability of some of these methods, rather than with the expectation of being able to describe all of the many methods known to be reliable.

No one article of diet is the subject of such frequent abuses as milk. So frequent have they become that laws have been enacted in many states fixing a standard of quality and regulating the traffic in it. More has been written upon milk within the last few years than ever before. Chemists have engaged in new analyses to determine the relative amount of nutritive materials that it may contain. Bacteriologists have found it a fertile field for research. Veterinarians have studied more carefully the bovine diseases and the effects of season, environment and diet upon dairy cows, and have endeavored to improve the conditions under which they are kept. Sanitarians have sought to make application of the knowledge thus secured, and have studied the importance of milk as a factor in the causation of disease and the conditions under which it may become morbific; and have endeavored to instruct the producers of, and traffickers in, this important article of diet in regard to its care and preservation, so that it may reach the consumer in as good condition as possible.

To the health authorities has been largely left the enforcement of the laws regulating the traffic in milk and the prevention of adulteration. In but few places has it been thought necessary by the health authorities to attempt more than to prevent adulterations, and so long as the milk contained the twelve or thirteen per cent. of solids, required where a standard has been fixed, but little attention has been paid to the presence of germs or other sources of contamination, or to the investigation of the milk sediments.

The milk question is to be considered in one of its sanitary aspects by Dr. Bonner, of Dayton, and I now consider it only from a business point of view. But looked upon simply as a commercial fraud, milk adulteration is a subject that should receive more attention at the hands of the health authorities; for although Ohio is famous as a grazing state, it is true that the milk furnished to our cities and towns is, much of it of inferior quality.

MILK STANDARDS.

Milk is composed of water holding in suspension or solution fat, casein, albumen, milk sugar, and certain salts, some soluble, others in suspension. These consist largely of phosphates, some citrates and a small quantity of chlorides. The components, when the water has been driven off, are spoken of as milk solids or total solids, and when the fat or butter has been removed, are spoken of as nonfatty solids or solids not fat. The composition of the non-fatty solids is as follows:

Sugar, about	4.30 per cent.
Proteids, about	4.00 per cent.
Salts, about	.70 per cent.

As the adulteration of milk is by the abstraction of the butter fat (cream), or by the addition of water, which affect the relative proportion of the milk solids and the water; milk standards have been based upon this proportion. The standards established by the different states and cities vary. That for Ohio was, until 1896, as follows:

Water, not over	87.50 per cent.
Total solids, not less than	12.50 per cent.
Fat, not less than	3.00 per cent.

But the last legislature reduced the standard to 12.00 per cent. for total solids, except for the months of May and June, when the requirements is 11.50 per cent., of which only 2.88 per cent. must be fat. Here permit me to call your attention to the fact that this is the lowest standard established by any one of the seventeen states in which a standard has been fixed, and I have been told that it has not infrequently been found in Cincinnati that skimmed milk, sold as such, has been above the Ohio standard for May and June in both total solids and fat.

The amounts fixed by most of the states are 12.00 per cent. of total solids and 3.00 per cent. of fat, though some require 12.50 per cent. of total solids and 3.50

per cent. of fat. So far as I have been able to ascertain, standards higher than this have been adopted in but few places. In Massachusetts, Minnesota and New Hampshire the standard for total solids is 13.00 per cent.

The milk standards, most of which were fixed in the last decade, were based upon the then common methods of determining the fat by what was known as the Wanklin method of extraction by ether, which gave results 0.50 per cent. below the correct amount, and they have not since been changed, although more accurate methods of fat extraction have been devised.

The richness of milk in butter varies with the breed. If the herd is composed entirely of Jersey or Guernsey cows the fat ranges from 4.08 per cent. in June to 5.75 per cent. in October; the Shorthorns range from 3.23 to 4.69 per cent.; while the Holstein-Friesians, which give the poorest milk, yield only from 3.05 to 3.89 per cent.. Any mixed herd will yield richer milk than the last named. The results of analyses of 120,540 samples of milk by Vieth (quoted by Leffman and Beam) gave an average as follows:

Fat	4.1 per cent.
Non-fatty solids	8.8 per cent.
Total solids	12.9 per cent.

The parliamentary commission to enquire into the operation of the food and dairy laws of England, reported in 1896 that the analyses of many samples of mixed milk, covering a period of thirteen years, showed results as follows:

Total solids—	Maximum	13.06 per cent.
	Minimum	12.68 per cent.
Fat—	Maximum	4.22 per cent.
	Minimum	3.91 per cent.
Solids not fat—	Maximum	8.88 per cent.
	Minimum	8.68 per cent.

The average of a great number of authorities that I have consulted is as follows:

Fat	3.86 per cent.
Solids not fat	9.07 per cent.
Total solids	12.93 per cent.
Ash	.70 per cent.

It will be seen then what an incentive to fraud there is in Ohio, where the standard will permit much skimming without reducing the milk below the legal requirement, even with herds yielding the poorest milk.

How to detect and prevent the sale of adulterated milk is by no means the easy matter generally supposed. Competition in milk production is very great, and many cannot resist the temptation to sophistication when the dangers of detection and prosecution are so small, the fines, if imposed, so trivial, and the profits so great that a dishonest dealer can pay the penalty several times and still be a pecuniary gainer.

Samples of milk for inspection should be collected by an authorized collector in bottles properly labeled, on which should be recorded the number of the dairy or name of the owner, the name of the driver of the wagon or seller of the milk, and the date of collection. They should be taken immediately to the laboratory for analysis, and samples not passing inspection by the mechanical methods to be described, or that are at all suspicious, should be subjected to such chemical analysis as will show the per cent. of water, total solids and fat.

The method first resorted to for determining the richness of milk was by testing the quantity of cream. For this purpose the

CREAMOMETER.

or cream gauge was used. This is a tall graduated glass, each degree on the scale representing one one-hundredth of its capacity. The milk to be tested is permitted to stand in the glass twenty-four hours, at a temperature of about 60 degrees F., in order that all of the cream may rise, when the scale should show about twelve per cent. by volume of cream if the milk is pure; but it has been found that the percentage of fat does not always bear the same relation to the cream—that the amount of cream varies with the size of the fat globules and the condition under which the milk has been kept. Especially for milk that has been carried far or much shaken, is this method inexact. For practical use, the creamometer is too slow. It may be used to show whether milk is open to suspicion, but twenty-four hours is too long a time to wait if chemical analyses are to be made, for Bevan has shown that there is a loss of total solids amounting to nearly one per cent. in the first twenty-four hours after milk is drawn. The creamometer, then has a limited application in town or city investigations, but is not sufficiently accurate for court purposes.

Before the days of milk inspections, the principal adulterations consisted in the removal of a part of the cream or the addition of water, but the introduction of the

LACTOMETER.

or lactodensimeter, an instrument for determining the density of milk, by showing an increased specific gravity when cream is removed and a diminished specific gravity when water is added, led to the general adoption by the more crafty dealers of a double method of increasing their gains, water being added to restore to the partially skimmed milk its normal density. The fallacy of relying upon the specific gravity alone to determine the purity of milk need not be dwelt upon. As a test of richness this method is unreliable for the reason that if for each part of cream removed one or two parts of water be added, according to the richness of the cream, the specific gravity will be brought within the limits of normal milk. The lactometer may stand at the same degree in skimmed and watered milk as in the pure article. To the experienced eye the lactometer may have some meaning. The mercury or shot in the bulb, furnishing a dark background, shows something of the copacity of the milk. If skimmed or watered and not colored, the bulb can be more clearly seen than in a pure sample. If used in unskimmed milk a creamy film adheres to the instrument on its withdrawal, and one accustomed to such examinations may be enabled to make a pretty good guess as to the quality of the milk under investigation. Without this experienced observation the lactometer is of no value, may indeed be misleading except when used in conjunction with the figures for fat or total solids. In that connection it is a valuable instrument and we cannot well dispense with it.

The lactometer, or lactodensimeter, is a specific gravity glass of special construction for determining the density of milk. The one in most common use, known as the New York Board of Health lactometer, has a scale the zero mark of which is the point at which the instrument floats in water at 60 degrees F., and with the one hundred mark at the point to which it sinks in milk having the lowest specific gravity of normal milk, i. e. 1.029. Each degree of the scale, then, represents one one-hundredth, and to convert these degrees into specific gravity degrees for comparison with water we must multiply the reading of the lactometer by 0.29 and add 1000. The divisions are carried to one hundred and twenty for the purpose of determining the specific gravity of milk that is above the average density of pure milk—generally skimmed or partially skimmed milk.

Another form of lactometer is that known as Quevenne's. The graduation of this is the same as on the hydrometer or common specific gravity glass, so that each degree is equal to one degree of specific gravity; but the zero of Quevnne's instrument corresponds to the 1000 mark of the hydrometer, hence to determine the specific gravity with this instrument it is only necessary to add 1000 to the reading of the lactometer. The degrees are marked only from 15 to 40. The Quevenne instrument is better than the Health Board lactometer only because it facilitates the conversion of lactometer degrees into degrees of specific gravity.

As the determination of density by the lactometer necessitates the use of a considerable amount of milk, the Westphol balance, specific gravity bottles and other devices requiring but a small amount of fluid have been resorted to, but as these are more expensive, require greater skill and very accurate scales for weighing, they are not generally used except by the expert chemist in the laboratory.

The specific gravity of pure milk varies with the amount of the different solids, their relative proportions, the temperature and other conditions. The milk from different cows may differ in density, and that from one cow is not always the same, being influenced by the season of the year, the breed of the cow, the character and amount of her food, the time since calving, etc. The average is about 1032, water being 1000 but it may be higher or lower. The limits for normal milk are 1029 and 1034, the milk being at a temperature of 60 degrees F. A higher degree than 1034 indicates that a part or all of the cream has been removed, a reduction below 1029 indicates either the addition of water or the presence of more than the normal amount of fat. As it is not always convenient to have the milk at 60 degrees, corrections may be made by adding one-tenth of a specific gravity degree for each degree of temperature above 60 degrees, and subtracting one-tenth for each degree below 60 degrees. In most books on testing milk there are published tables for correcting the readings of the lactometer when taken at other temperatures, and sufficiently accurate results are thereby obtained if the temperature is not more than ten degrees above or below 60 degrees. The milk should stand at least one hour after milking before the specific gravity is taken, as, in the process of milking it takes up more or less air, and until this is given off the correct density cannot be determined. On account of the unreliability of gravimetric tests when used alone, resort has sometimes been had to other methods. One of these is by testing the opacity of milk. Recognizing that the opacity is largely due to the fat globules, it has been sought to detect abstraction of cream by testing the opacity of the milk. For this purpose different instruments have been devised. Probably the best of these is the

FESER LACTOSCOPE.

which is a glass cylinder having a contraction at the lower end in the center of which is a smaller cylinder of white glass on which are a number of black lines. Into this glass are poured four cubic centimeters of the milk to be tested. Water is gradually added, the mixture being thoroughtly shaken after each addition until with the glass held at arm's length, the black lines are just visible. On the sides of the larger part of the cylinder are scales which indicate the amount of water added and the percentage of fat in the milk. As the opacity depends largely upon the fat globules, of course the richer the milk the greater the amount of water that must be added to render the black lines visible. Another instrument based upon the same erroneous principle is Heevan's pioscope, and there are several others. If milk were only skimmed or watered, this test might be relied upon as sufficiently accurate, but keeping in mind the fact that these instruments are measures of opacity only, we can see the unreliability of tests by them, for sophisticated milk is generally colored by the addition of annatto, caramel, saffron, carrotin, or certain coal-tar colors. These are the most frequent additions to cover inferiority in quality, and they are objectionable because used to conceal fraud. In cities where coloring has been suppressed improvement in the quality of milk has invariably been the result.

The instruments so far mentioned belong to what may be called the mechanical method of milk inspection. They are, as I have shown, not free from liability to error and cannot be relied upon when prosecutions are to be brought for milk adulteration, but used together they may be regarded as sufficiently accurate to indicate the samples that ought to be subjected to chemical analysis, to which resort must be had in all court cases.

CHEMICAL ANALYSIS.

It is not necessary to have elaborate analyses that will show the exact composition of milk, the amount of proteids or sugar, as standards for these have not been fixed, nor is it necessary to determine the amount of salts; but the percentage of total solids, fat and water must be shown. As these are the constituents for which standards are fixed, it is necessary to determine them by the most accurate means, and that is by chemical analysis. Anything but a slight departure from the relative proportion of these constituents is sufficient to establish the fact that the milk has been adulterated, and samples found in any way suspicious should be subjected to a second analysis before prosecution is begun, so that the danger of mistake may be reduced to the minimum. There is nothing very complicated in the chemical examinations, but they require care, and there are few towns in the state that do not number among their citizens one or more persons sufficiently familiar with chemistry and chemical manipulations to make these analyses with such accuracy as to detect even slight adulterations.

The process as formerly conducted was, after having ascertained the specific gravity, to determine first the percentage of water and total solids by putting a weighed quantity of the milk into an evaporating dish (preferably of platinum if the ash is to be determined), the weight of which is known. The milk is then evaporated over a water bath to apparent dryness. The dish is then transferred to a drying oven and dried to constant weight. It is then reweighed, and the loss of weight represents the water driven off by evaporation, and the difference between the weight of the dish and that of the dish and residue gives the amount of total solids in the quantity of milk used. From this the percentage of water is calculated by multiplying the weight of water by one hundred and dividing by the weight of milk used. The percentage of solids is ascertained by the same rule. Two of the required data are now known—the per cent. of water and total solids. The determination of the per cent. of fat is more difficult, and many different methods of effecting this have been devised.

As formerly conducted, the fat was extracted from the other solids by dissolving it out by means of ether or petroleum spirit—the latter being generally used because of its comparative cheapness. By this method the evaporating dish containing the residue, or total solids, is treated several times with ether or petroleum spirit by almost filling it and bringing it nearly to the boiling point over water, and then decanting the solvent. The fat being removed as thoroughly as possible, the dish and contents are again dried and weighed, and the loss represents the fat dissolved out, and from this the percentage is ascertained by calculation.

If the determination of the ash is desired, the plantinum dish containing the residue is heated until the contents are white. They are then weighed, and the weight of the dish being subtracted, gives the amount of ash.

As the method just described gives about 0.5 of one per cent. less than the actual amount of fat, other methods of determination are now preferred.

That known as Adams' method is one often used. It consists in spreading a weighed quantity of milk, generally about five grammes, over a specially prepared absorbent paper. The paper is then thoroughly dried in a water oven or air bath, and is placed in an extraction glass, such as Knoffler's or Soxhlet's, and the fat extracted with ether or petroleum spirit. The flask of the apparatus, which has been previously weighed, now contains the fat dissolved in the ether. By distillation, the latter is driven off, the flask again weighed, and the increase represents the amount of fat.

Short's test. The first invention in this country to take the place of the old chemical tests was that invented by Mr. F. G. Short, of Wisconsin. This consists in the conversion of the butter fat into soap by means of an alkali and then decomposing the soap by means of sulphuric and acetic acids. The process is carried on in a glass test bottle, and after prolonged boiling, to set free the fat, it is brought into the graduated neck of the bottle by the addition of hot water, and the per cent. of fat read off on the scale. This method has not been much used because of the time required for boiling, and because the delicacy of manipulation made it difficult for those not expert in chemical analyses, and because other and easier methods have been devised.

Soxhlet's method. Another method of fat determination is by means of Soxhlet's "aerometer." By this method the fat is dissolved in ether and the specific gravity of the etherial solution is determined, and from this the percentage of fat is calculated. With the proper instruments, this method is accurate and simple.

A great many methods for the quick determination of fat in milk have been devised, as Failyer and Willard's, Patrick's, Parson's, Beimling's, Werner-Schmid's Cochran's, and many others on the same general principle of fat extraction or the solution of non-fatty solids by chemicals. Chemists at several of the agricultural experiment stations have devised different methods of fat extraction, many of them simple, but some of them requiring complicated instruments and delicate manipulation. Time will not permit of even brief description of all of them this afternoon, but the student, dairyman, or inspector will find full description in the books on milk testing, of which there are many new, instructive and interesting.

CENTRIFUGAL MACHINES.

By the application of centrifugal machinery to the seperation of liquids of different density, and by the addition to the milk of reagents to dissolve the fat or destroy the non-fatty solids, it has been found possible to greatly simplify the process of fat determination. As these tests are very delicate, they require care in the measurements and the test bottles; graduated pipetts and measuring glasses must be of the most careful graduation.

The Leffman and Beam method, invented by them, but sometimes called Beimling's method, is said to be very satisfactory. The cost of the apparatus is not great, and the manipulation is simple. It requires a centrifuge and specially devised bottles having a capacity of 30 c. c. with graduated necks, each division of the scale representing one-tenth of one per cent. by weight of fat contained in 15 c. c. of milk. The process is fully described by them in their work, "Analysis of Milk and Milk Products," published by P. Blakiston, Son & Co., Philadelphia. The chemicals used for the separation of the fat are amyl alcohol, strong hydrochloric and sulphuric acids, and water. By centrifugation the fat is collected in the neck of the bottle and the percentage may be read off.

The Babcock test. The test now used in nearly all creameries and cheese factories, and applicable to health office uses, is that invented by Dr. S. M. Babcock, chemist to the Wisconsin Experiment Station, and described in bulletin No. 24 of that station, in 1890. It is simple, cheap, and speedy in its operations, is sufficiently accurate with high or low percentages of fat, only one chemical is used, it does not require an expert chemist, and the number of samples that can be tested at one time is limited only by the size of the machine. The completed test will keep in-definitely, and the test is applicable to sour milk, skimmed milk, butter milk, condensed milk or cream. In this test sulphuric acid, having a special gravity of 1.82, is used to destroy the non-fatty solids; after which, by centrifugation, the liberated fat is collected in the proximal part of the test bottle, on the graduated scale of which can be read the percentage of fat. The Babcock test has no advantage over that of Leffmann and Beam, except that only one reagent is used.

Other tests employing the centrifugal separator have been introduced, as Gerber's using the same reagents as Leffman & Beam; the De Laval, using the same reagent as the Babcock method, but a different apparatus for effecting the separation.

For a full description of these machines, and complete directions for making the test, I must refer you to some one of the many numerous hand-books on milk testing: "Milk and its Products," by Wing; "Testing Milk and its Products," by Farrington and Woll; "Analysis of Milk and Milk Products," by Leffman and Beam, are among the latest, but there may be others equally good

THE CALCULATION METHOD.

The relative proportion of fat and total solids to the specific gravity of unskimmed milk being pretty constant, it is possible when the specific gravity and one of these data are known, to calculate the other by means of formulas given for the purpose. Suppose that the specific gravity and the total solids have been ascertained, the percentage of fat may be determined with sufficient accuracy by the following formula:

$$.859\ T - .2186\ G = F.$$

In this formula, T represents the total solids, F the fat, and G the last two units of sp. gr. with any decimals, e. g. if sp. gr. is 1032.50, the multiplicand will be 32.50.

If the specific gravity and the fat are known, the total solids may be calculated by the following formula:

$$\frac{G}{4} + \frac{6\ F}{5} + .14 = T.$$

These formulas are sufficiently accurate for milk near the normal, but the first gives results slightly too high for the fat if the milk has been skimmed.

In Leffman and Beam's, Farrington and Woll's, and some other works, will be found tables showing total solids calculated from the fat and specific gravity which will be found convenient for reference, as they enable us to dispense with the lengthy calculations necessary in formulas so involved.

[The different kinds of lactometers, Feser's lactoscope, Babcock's centrifuge and bottles, and other instruments were shown by Dr. Stanton, and analyses of cream, pure milk, and skimmed milk by the Babcock method, were made by Mr. Charles Hennick, of the health department of Columbus.]

The President: Gentlemen, Dr. Stanton's paper is before you for discussion.

Dr. J. B. Alcorn, Gallipolis: We have listened to a very interesting paper. As I understand Dr. Stanton, he states that the solids of the milk required by the state law are only 12 per cent. and that he finds in an examination of even the poorest quality, leaving out the watered stock as I understand it, the per cent. of solids is more than 12 per cent. As I understand you, Dr. Stanton, the poorest samples of cow's milk contained more than 12 per cent. of solids.

Dr. Stanton: The poorest samples of unadulterated cow's milk contained more than 12 per cent. of solids, and I said that some of the milk that sold as skimmed milk in Cincinnati, showed a higher per cent. of total solids and fat than the standard fixed by the last legislature of Ohio for the months of May and June.

Dr. Alcorn: I would suggest that a bill be introduced into this legislature to at least raise the standard of solids in milk up to what is found in the poorest quality of milk.

Dr. Stanton: The standard has been since 1888. 12 5 per cent., but it was reduced by the last legislature to 12 per cent. of solids, except for the months of May and June, when it may be not less than 11.5 per cent., of which 2.88 per cent. must be fat.

Dr. C. C. Williams, Niles: In speaking of the analysis, I do not know whether I understood the gentleman. He said, if I understood him, in making an analysis, that by taking the specific gravity of the ether we could not get the exact analysis closer than one-half of one per cent. Then further on he made the statement that by taking the specific gravity of the ether, after extracting the fat, that we could get the exact analysis. Now, there must be something wrong. I do not understand the two statements.

Dr. Stanton: The difference is in the method. One method I said was not exact, the method is known as Wanklin's, in which the fat is dissolved out from the total solids by washing with ether. Then the non-fatty solids are weighed and the difference gives a little less than the correct per cent. of fat. The other method I spoke of, is where the fats are dissolved out by ether, then the specific gravity of the ether is determined. This is known as Soxhlet's method. It is done by a certain kind of instrument, and in such a way that there is no time for evaporation of the ether, and as a very small per cent. of fat added to the ether greatly increases the specific gravity, it makes the determination by that method very accurate; but it has not been adopted because it requires one who is familiar with chemical tests and chemical manipulations to make it accurate; and tests of that kind are not made in this country, so far as I know, except in Cincinnati, where we have connected with our health board a chemist and bacteriologist.

The President: Is there any further discussion upon this subject?

Dr. F. E. Kitzmiller, Piqua: I would like to ask if this sort of a test (Babcock's) would be sufficient evidence to convict a dairyman for selling adulterated milk? After going through this method and finding the milk below the standard, I would like to know whether this would be sufficient to convict him under the laws of the state of selling adulterated milk.

Dr. Stanton: I think it would. I do not know that it has ever been tested, but Mr. Hennick may be able to tell us. Mr. Hennick, have you had prosecutions in this city for selling adulterated milk?

Dr. Hoover: Mr. Hennick has left the room. Dr. Schueller, who is the health officer of Columbus, is present, and perhaps he can tell.

Dr. Stanton: Dr. Schueller, can you tell us if you have had any legal tests here?

Dr. Schueller: Not to my knowledge.

Dr. Stanton: I will say that the method has been tested in this city. Samples of milk were taken and divided and sent to the Ohio State University, and tests were made there and by the health office, and these tests were found to correspond exactly. No matter how much adulteration or how little, the results were the same. So this may be regarded as an accurate test, one that is as accurate as most chemical manipulations, and I have no doubt it would be sufficiently accurate for court cases.

The President: If there is no further discussion on this paper, I see Dr. Bonner has arrived, and his paper is "The Prevention of Milk Communicable Diseases." Is it the pleasure of the Convention to hear this paper now?

And thereupon, on motion, it was decided to listen next to the address by Dr. Bonner, health officer of Dayton.

The President: Gentlemen, I have the pleasure of introducing Dr. Bonner.

THE PREVENTION OF MILK COMMUNICABLE DISEASES.

By DR. C. A. BONNER, Health Officer, Dayton.

The question of the prevention of milk communicable diseases is one of very great importance to all mankind. It is at the present time receiving more attention from the various boards of health than any other subject. It is not new; it has been discussed for several years, but at no time have we had the results we are having today. And why? Because we are possessed with a more definite knowledge of the cause of this class of diseases.

Many diseases, in former times which almost devastated the entire community, have been eradicated by strict cleanliness and hygienic measures.

Black death, the greatest pestilence in the fourteenth century, spread over Europe, Asia and Africa, and claimed for its victims over 24,000,000 of people.

A disease known as the plague, has at different times been the scourge of various countries, and, no doubt, was the black death, whose ravages have been so graphically described by Hecker. The limiting and suppression of the plague was due to the enforcement of rigid quarantine laws and sanitary regulations. Not only have these diseases become quite unknown, but others have become very much lessened in their frequency.

Typhus fever and cholera are not nearly so prevalent; and it has been due to the adoption of sanitary measures very largely.

Our forefathers had some very crude ideas as to the causes of epidemic diseases of their day. They believed the planets, in some way, exerted a peculiar influence; and that the earth became sick and had spasmodic convulsions. Another belief was a peculiar contagium vivum for each and every disease; also that small animals floated around in the air, conveying the disease from one locality to another. They thought these small animals could be killed, or driven away, by the blowing of trumpets or firing of cannons. Science has taught us different, and today we have a much better knowledge of the cause of this class of diseases.

Before we consider how best to prevent milk communicable diseases, it is necessary to know something about the agent of communication, or transmission; and this agent is known to be small living organisms; so small as to be detected only by a powerful microscope, hence they are called micro-organisms.

The most important milk communicable diseases are the diarrhoeal diseases, typhoid fever, diphtheria, scarlet fever and tuberculosis. The evidence is conclusive that epidemics of all of these diseases have been caused at times by contaminated milk. Two-thirds of all children dying under the age of one year have been artificially fed. The feeding of impure and contaminated milk, especially in the summer months, is the most important predisposing cause to diarrhoeal diseases among children.

The condition of the milk may be due to disease in the cow, to adulteration or pollution at the dairy, during transportation, or in the homes. It may be due to unclean vessels in which the milk is kept, or the bottles from which it is fed. It may also be due to the specific infection, or fermentative changes, as well as the age of the milk.

That diphtheria can be contracted and disseminated by contaminated milk, I think none will deny. Epidemics of diphtheria have been traced to milk time and again, where some one in the dairyman's family had the disease and several of his customers have contracted it. This disease occurs among domesticated animals, and I have no doubt, that in many cases of diphtheria in human beings, where the source of infection has been obscure it was transmitted through the milk of a cow suffering with this disease.

There can be no question but that the milkman is frequently responsible for outbreaks of typhoid fever. Innocently, of course, in spreading the disease, from lack of knowledge in laboratory work, but unscrupulous enough to increase his profits by the addition of water contaminated with the germs of typhoid fever, or polluted water may have been used to cleanse the milk cans. It being only necessary for a few of these germs to find their way into the milk, for once there they rapidly multiply.

Scarlet fever is a disease to be dreaded on account of the mortality which it causes, and also on account of the permanent injuries which result from it. The only preventive is to keep away from it, and not allow anything infected with it to come near. The power of milk to convey the contagion is now so well proven, that it is necessary to use every precaution possible to prevent its spread. Epidemics have been traced to milk supply, and it is a well known fact that milk has been contaminated from one working in the dairy convalescent from scarlet fever; also from milk kept for sale in places where there was a case of scarlet fever, and from cast off clothing from scarlet fever patients being used to cleanse the cans.

The great scourge of the human race today is one which claims for its reward three hundred and fifty souls every twenty-four hours in the United States alone. It chooses for its prey from all walks of life. It respects neither age nor riches, but goes on with that merciless destruction of life which makes all other diseases fade away. Now slowly, but surely, we see coming from the darkness into the light that dread disease of all diseases, consumption.

Bacteriological investigations have demonstrated, beyond a doubt, that tuberculous cows spread the disease through the medium of milk. The question has been fairly discussed, and the evidence is conclusive. We are safe in making the statement that one out of ten of all cows supplying our cities with milk is suffering with tuberculosis. This certainly should give us great concern for the future generations. The communication of tuberculosis by milk of tuberculous animals has been sufficiently demonstrated to demand the employment of some very stringent measures to lessen the possibility. The unexpected discovery of tuberculosis in a herd of apparently healthy and well nourished milk cattle is not an unfrequent occurrence, and should receive prompt attention.

Many stables are so small that there is hardly room for the cows to stand. The floors are a mass of filth; drainage and ventilation receive no attention whatever; the atmosphere is so bad as to be almost unbearable; the cows are fed upon slops and allowed to drink water from a pool in the stable yard, into which runs the drainage from the stable. The udders of the cows are not clean; the milk is drawn into large buckets, strained into cans, the strainer being almost clogged up with filth and swarms of flies. Milk thus obtained has anything but an inviting odor; it will not remain sweet twelve hours, and is loaded with bacteria.

That which confronts us now is, "How to prevent these diseases being communicated by milk." In the first place the local boards of health must regulate the milk supply. It is their duty to know that the milk shall be delivered to the consumers pure, unadulterated and uncontaminated. And that no one should be allowed to engage in the sale of milk without first having a certificate, issued by the proper authorities and no one should receive a certificate under any circumstances until after a careful and thorough inspection of the herds by a competent veterinarian whose duty it should be to scrutinize the herd as if they were applying for a life insurance, and in every case give the tuberculin test, the advantage of which can not be over-estimated.

Should there occur a case of contagious disease in the family of any one who handles or sells milk, they should be prepared to guard against the source of danger. A person convalescent from any such disease should not be allowed to enter the barn nor handle the milk. All such persons connected with the sale or handling of milk should be compelled to notify the authorities, and abstain from their work until they have permission to resume.

A few years ago it was thought we could only have pure and uncontaminated milk by sterilizing it. As it was commonly practiced, to destroy germs amounted to nothing in the bacteriological sense of the word. It does, however, destroy such pathogenic germs as may be present, and other bacteria, and prevent the milk from fermentative changes for a short time. Boiling milk for some time will destroy all germs, and prevent fermentation for several days. It must not be forgotten, however, that certain changes will take place, and the nutritive properties will be impaired. This can be overcome partly, however, by Pasteurizing, which is heating the milk for a short time at a low temperature. This does not destroy the spores, but will destroy the germs of the diseases I have mentioned, and the milk will remain sweet for several days, at an ordinary temperature. The sale of Pasteurized milk has been an utter failure, and a base fraud imposed upon the public where practiced. My preference is to use milk that is pure, fresh and clean, which renders heating unnecessary.

No bacteria are present in milk as it exists in the udder of a healthy cow. It is absolutely sterile. Milk that is contaminated with disease germs must be either through disease in the animal or from being exposed to the germs from some outside source. The object of sanitary milk control is to keep them out, and this can be done. This movement has come to stay, and milk will have to go, or come to us pure and uncontaminated. In order to accomplish this purpose we must have competent and able inspectors, who have been trained, to accomplish the desired results. The stables must be good, clean, light, and well ventilated. The nature and quality of the food must not be overlooked Food which has become decomposed, or undergone fermentation, should not be used; nothing but good grain, hay and grasses should be fed if we are to expect good milk. The water supply should be of the best and always fresh. Cows should not be allowed to drink from ponds or cess pools in and around the stable yards. The dairy barn should be entirely separate from dwelling houses. It should have its own water supply, where all the work of cleansing the necessary utensils should be done. There should be a hot water apparatus, and a sterilizer in connection with it, where all the receptacles for milk could be sterilized.

The cow's udder should be washed with sterilized water, as well as the hands of the milkman. He should be as neat, clean and tidy as the surgeon in the operating room. By milking directly into sterilized glassware, arranged so as to exclude the dust and air, it is possible to obtain milk free from bacteria. It should not be removed from this container, but immediately placed in a refrigerator and kept at a temperature of 40 degrees F. until it reaches the consumer. It should then be placed in the refrigerator at the same temperature until used. This can be accomplished at a very small expense by having a cold storage in connection with the dairy barn, and using refrigerator wagons for delivery.

The people have been educated to the importance of having pure milk, but they are aware of the fact that it is almost impossible to get it. Therefore, I can not urge too strongly the necessity of the various local boards of health to try to educate the dairymen and milk dealers how to supply their trade with pure and uncontaminated milk. In order to accomplish the desired results, a veterianarian must frequently inspect the herds to see that all are healthy, in good condition, properly fed, watered and cared for, and exclude those that are pregnant. The sanitary inspectors must see that the stables are clean, well ventilated, and not overcrowded; that all utensils used in connection with the care, handling and delivery of milk, are properly sterilized. The chemist and bacteriologist must make frequent examinations to prove that the source of supply is beyond suspicion.

In conclusion, allow me to say that the dairyman who will conduct his business as I have described, will not only prevent these diseases being communicated by milk, but will also receive returns financially, which otherwise could not be obtained.

The President: Gentlemen, the paper is before you for discussion.

Dr. G. L. Starr: What effect would ensilage have fed to dairy cows? I mean by that corn cut up and stored in air-tight reservoirs, then raised to fermentation by heat, and fed to the cows.

Dr. Bonner: I do not think you will get pure food after this has gone through a fermentative process. The milk will not have the amount of solids or butter fat that it will if you feed pure fresh grain.

Question: Is there any danger from a bacteriological point of view?

Dr. Bonner: I think so.

Dr. Stanton: For some reason or other, milk from cows fed ensilage has not the keeping properties of other milk. I cannot explain why such is the case.

Question: How do you account for that?

Dr. Stanton: I say I cannot account for it. Probably from the presence of some germ. The same may be said of cows that are fed slops. It doesn't directly injure the milk. It may be richer milk. Indeed, much of the milk that comes from dairies, or cows that are fed on slops, is richer in cream and butter fat than milk from cows fed in other ways. It is not always so. It is not so unless the slop enters into the food to a small extent. Such milk, for instance, cannot be used in making condensed milk, for, while its richness may be increased, it loses its power or possibility of preservation. While I am on the floor, I would like to call attention to a fact that occurred to my mind while the doctor was reading his paper, and that is that milk may very often contain tubercle bacilli when the udder itself is free from disease.

Dr. Probst: The author referred to the inspection of milk and dairies. In the last annual report of the State Board of Health, which has just been received from the printer and which has not been distributed, the question was asked of health officers of cities of over four thousand inhabitants whether they have milk inspectors, and whether they keep a record of the names, residences and places of business of all persons engaged in the sale of milk. There were sixty-two cities that reported; and out of this number twenty-nine said they kept a record of those who are furnishing milk to their cities. There were eighteen milk inspectors in these sixty-two cities. Now, section 2133 of the Revised Statutes, makes it mandatory on boards of health to keep this record. It says, "and the board of health shall keep for public inspection a record of the names, residence and place of business of all persons engaged in the sale of milk and meat, and may require permits, after inspection, to vend either milk or meat." We have many epidemics of typhoid fever that come from milk, but the health officer never knows anything about it until it is too late to do any good. It requires about twelve to fourteen days for the disease to develop; consequently, he does not hear of these diseases until two weeks after they are distributed by milk. If a record is kept by every health officer of those who are furnishing milk to his city, and if he could arrange with the boards of health to make an immediate report to him of any cases of typhoid fever, scarlet fever or diphtheria occurring in those families where they are sending milk to the city, steps could be taken to stop the sale of that milk in the city before it is too late.

Dr. F. C. Smith, Geneva: I would like to ask how a local board is going to compel milkmen and dairymen to wash a cow's udder and sterilize the utensils that they use. How is a local board in a town of two or three thousand going to do that?

Dr. Bonner: Every local board of health could have a sanitary policeman or somebody to inspect the dairies and see that the dairies are fit for this purpose, and as soon as you can educate the dairymen to sterilize the glassware that contains their milk, they will find that they have a better sale for their milk than they ever had before. All we need is education. I know men in our town that could not exist at anything else that are peddling milk around town.

Mr. H. Beistline, Shelby: A couple of years ago we had an instance in our place where the milk was considered impure, and we traced it up and found where it originated; measures were taken to stop the sale of milk from that animal and we had no trouble after that.

Dr. R. W. Chalfant, Bellefontaine: In our city we have perhaps half a dozen dairymen, but we also have a great many people that keep a cow, and they sell milk to the neighbors. A great many of them make a nice little sum in that way. Now, are we to go around and examine these cows and see that these persons have their utensils in good order or stop them?

Dr. Bonner: I do not believe that the milk of any cow ought to be allowed to be sold in the state of Ohio without first having the tuberculin test made, and everything in the dairy inspected before they are given a permit to sell it.

Dr. Cossitt, Conneaut: I would like to ask how we are to have any jurisdiction over milkmen that live in the townships adjoining the village and peddling milk in the town. I would like to know if we have a right as a board of health in a village to inspect such dairies?

Dr. Bonner: Mr. Chairman, I do not know whether I am competent to answer that question, but I believe any local board of health can inspect any milk or any dairy where the milk is brought to its town for sale. Anyhow, if there is no law, it can be done, because there is no dairyman that is going to stir up a fight on that question. He does not want to be advertised in that way.

Dr. Cossitt: The reason I asked that question, Mr. President, is that the law calls for the township trustees, as I understand it, to be constituted a board of health for the township, and of course the board of health in the village has no jurisdiction further than in the village. Of course they could compel them to stop selling milk in the town.

Dr. Stanton: I think they may make a rule that no milk shall be sold in their corporation except from dairies which have been inspected by their officer. If there is any objection to their inspecting the dairy they will have to simply shut off the sale of the milk rom that dairy.

Question: Ought dairymen to be compelled to furnish an analysis of their milk?

Dr. Stanton: No, I think not.

Dr. F. T. Miles, Salem: We have had inspection of dairies in Salem for some time. We inspect the dairies once each month; have a veterinary surgeon make the examination, and twice a year make a physical examination of the cows. We charge the dairymen for that and they pay it. We do not allow milk sold in the city, where sold from more than one cow, without an examination being made, both of the cow and the place where the milk is kept, and we charge fifty cents for each examination. I do not know whether we have authority to make this charge, but it goes a great way toward paying our inspector. We have about 200 cows from which milk is sold in the city of Salem.

Dr. Kirkpatrick, London: I would like to ask whether this discussion is for the benefit of those on the platform altogether, or is it for those here assembled? We have not heard a word of the discussion.

The President: I would suggest, Doctor, that if you will come up nearer the front you will hear better.

Dr. J. D. Hayes, Somerset: I may be deviating a little from the scope of the paper, yet what I have to say I think comes in the same line. There is a little industry carried on in our community that I think has a tendency to not only affect the people in our immediate vicinity, in our town, but the people in the cities as well. That is the gathering up of milk all over the country and shipping it to some creamery, where it is manufactured into butter. This is shipped to the hotels of the cities, and is eaten at the hotels and boarding houses. I think there is no process which this goes through that would destroy the germs in the milk, and I think it should be looked after as well as the milk that is brought and drank.

Mr. F. S. Reefy, Elyria: It seems to me that we should work more extensively in this line than we have in the past. This is a very important subject. I think we all agree that the more we study this subject the more we can trace disease to impurities in milk, probably more than to any other cause, and we should get all the influence we can possibly secure in favor of thus carrying out the recommendations that the doctor presented in his paper. I think we should strike in the direction of the Agricultural Department. They are sending out lecturers all over the state to farmers' institutes. These subjects should be discussed more than they are. We do not want to clean up and provide these stables and barn yards for the cities alone but for the whole country. I am fully persuaded that typhoid fever has its origin in the improper handling of milk, and the thing to do is to get the largest possible force to work to prevent the disease all over the state.

Mr. F. M. Wood, Dent: In our township we have dairymen that are peddling milk around through the township. I would like to ask Dr. Probst whether it is our duty to have these dairies examined. We have one dairyman that lives in the city who does a good business out through the township.

Dr. Probst: I do not believe I understand the gentleman's question.

The President: The gentleman wants to know if they have control over dairies that are kept in his town where the milk is sold out through the township.

Mr. Wood: I say we have dairymen who peddle milk through a portion of our township. Now, we are the trustees—the board of health in the township—and the thing never occurred to us that we have any particular right to examine such dairies, but from the discussion here to-day I am in doubt, and would like to know, after hearing you read the law, whether we have that authority? It would seem to me that it would be as much our duty to examine these dairies where they are peddling in the township as where they are peddling in the city.

Dr. Probst: As I understand the law, the expectation is that the health officers of the city will inspect all dairies that are furnishing milk to that particular city. Section 2134 fully authorizes it.

Mr. Wood: I would like to know if the township board of health has any business to look after the milk that is sold in the township?

Dr. Probst: By all means you should look after the milk that is distributed through your township.

Mr. Wood: This dairyman lives inside the corporation of Cincinnati. They were formerly a part of our township, and he now peddles outside the corporation in the township.

Dr. Probst: You have a right to go into Cincinnati and inspect that dairy.

Mr. Wood: That is our right, but I want to know whether it is your opinion that we should do so?

Dr. Probst: I think it is your duty to see to it.

Dr. Robinson: I would like to ask Dr. Probst this question: Whether this inspection of dairies is required in all villages or only in places of four thousand inhabitants and over? Our place is only about 1,500 or 2,000 inhabitants, and I do not know whether we are required to have inspection at our place or not.

Dr. Probst: I would answer the question by saying that the inspection is not required, but the record to be kept of those urnishing milk is required of every board of health.

Dr. Chalfant, Bellefontaine: I do not think it would be right to compel dairymen to pay for this inspection. I believe we ought to do it independently, although I do not believe there is a dairyman in the state of Ohio who would object to it. I do not think we ought to be under any obligations to them.

Dr. Alcorn, Gallipolis. Doctor, in your paper you stated that tuberculosis could be communicated, but you did not state whether the person was in good health or whether he was susceptible to tuberculosis.

Dr. J. F. Marchand, Canton: I am not here to make an apology for the cow or to excuse the dairyman, but I would like to speak just for a minute on a subject that has not been presented since I have been in the room. I think that a great deal of danger in the distribution of milk by dairymen through our cities is largely due to the ticket system which they have with their customers; selling them a dollar's worth of tickets, and then the customer goes out with a ticket in the pan or pitcher and gets his milk. Now, those tickets may be used for playthings in families where there have been contagious diseases. Only a few years ago I summoned the Secretary of the State Board of Health to our city to aid in finding the cause of diphtheria which we were having. Before we sent for him, however, I had found that over forty cases of diphtheria were on the trail of a certain milkman. We made a careful examination of the dairy from which this milk came. We had a very competent veterinary surgeon look over the cattle, and he pronounced them all right. We found that the milkman had been using tickets, and I think the way the disease originated was that in a family where these tickets had been used there was a case of diphtheria, and probably the children, during their convalescence, had been given these tickets to play with; and they went into general distribution again and we had over forty cases from that milkman alone. It seems to me that a great deal of our milk is contaminated after it leaves the dairy.

Dr. Bonner: I think the doctor did not hear my paper. I tried to make that plain. I tried to make it plain that all utensils connected with a dairy must be sterilized, and the milk kept in glass vessels until it is delivered to the consumers.

Dr. Smith, Geneva: I would like to speak about a system we have in Geneva. A few there have a scheme of putting a snap on to the pail and another snap on the end of that wherein they put the tickets, so that the old nasty tickets which the children have put into their mouths—perhaps they have had sore throat—do not go into the bottom of the pail.

Dr. W. A. Daugherty, Bucyrus: Our milkmen use punch-tickets. They have a card, and when twenty-five holes have been punched in it they throw it away or burn it, and I think this is preferable to using single tickets.

Dr. D. H. Young, Chicago Junction: The method used in Bucyrus is the one we have adopted at our place, and it gives very good satisfaction. We discarded the use of tickets.

V. H. Harris, Fostoria: Lee De Voll, at Marietta, keeps a model dairy of about fifty Jersey cows. The milk is at once taken from the barn to the cooling-room, put through a strainer and the animal heat taken out of it. It drops into a tank below, and from there it is all bottled in air-tight bottles and sold in bottles. He feeds his cows ensilage. by the way, and he has no difficulty in keeping the milk from Saturday until Monday. The barn has a cement floor. It is cleaned twice a day in winter and once in summer.

Dr. Cossitt, Conneaut: The nicest scheme that I have heard of is one in which a number of small tickets are printed on a page and sold in book form, and they can be used but once, and for each quart a ticket is torn off, and afterwards destroyed. Now, I think the ticket system is really abominable, that is, as most of us are acquainted with it, and there should be something done about it. Before we require the dairyman to be extra clean, I think we ought to require the tickets to be used but once.

Prof. Reefy: I would use metallic tickets; make them out of tin and scald them every time.

The President: Gentlemen, the time is passing. Doubtless very much more could be said upon this subject, but I think we would better call the third number on the program, "The Present Position of Formaldehyde as a Disinfectant.

THE PRESENT POSITION OF FORMALDEHYDE AS A DISINFECTANT.

By Dr. C. O. Probst, Secretary.

Mr. President: Perhaps no question has excited more interest among health officials and sanitarians during the last two years than that of the use of formalin, or formaldehyde, as a disinfectant. We have absolute proof that under favorable conditions the germ, or other cause of diphtheria, scarlet fever, small-pox, consumption, and other diseases of this class, retain their power of communicating disease for considerable periods of time—months if not years. And when a case of contagious disease is reported to a health officer it is a matter of much anxiety to him to have the house of the patient, and especially the sick-room, disinfected or made safe for others to enter it.

We have no difficulty in destroying these disease producing organisms when we can get at them. We have liquid poisons or disinfectants which we know will kill all disease producing material. But in practice it is exceedingly difficult to bring such disinfectants in contact with every surface and every crack and cranny which may harbor these invisible germs. For years we have depended upon the fumes of burning sulphur; and it has seemed to give us good results in practice. Our bacteriologists tell us, however, that sulphur fumes do not destroy all kinds of germs, and that it is especially inactive except in the presence of moisture.

A few years ago formaldehyde, a gas derived from formalin, or direct from wood alcohol, was heralded as the ideal gaseous disinfectant. Experiments seemed to show that this gas was capable of rapidly destroying all forms of bacteria; and not only those on the surface of rooms or clothing, but that it had great penetrating powers. Disease germs surrounded by several thicknesses of blanket, in the center of mattresses, wrapped in layers of cotton, or between leaves of books, we were told, were readily killed. The announcement was hailed with joy, and health officers everywhere were eagerly inquiring for practical methods for applying the new disinfectant. Makers of sanitary and allied apparatus were quick to meet this demand. A number of formaldehyde lamps and generators were placed on the market, and the question with health officers became (and is, for this is very recent history) not, where can I get a formaldehyde generator or lamp, but what is the best?

Last year our association had a most valuable paper on this subject by Prof. Bleile of the Ohio State University. He showed us that formalin is a most powerful disinfectant, even in comparatively weak solutions. He also demonstrated the use of a simple, inexpensive apparatus for generating formaldehyde—the gas—from formalin; and gave the results of a series of experiments proving his ability to destroy the most resisting germs by the apparatus described by him.

Since that time a number of experiments have been conducted by different bacteriologists which indicate that the results obtained in the use of formaldehyde are not always the same; the action of the gas is modified by conditions not clearly understood. Recent experiments show that the volume of gas generated by the different apparatus, and upon which their efficiency must largely depend, is not always the same; and especially is this true of the various lamps which use wood alcohol from which to generate the formaldehyde.

Dr. De Schweinitz, of the Bureau of Animal Industry, Washington, D. C., in experiments just completed, has shown that lamps of this class generate not to exceed twenty per cent., and some as low or less than five per cent. of the amount of gas guaranteed by their makers, and theoretically possible. The amount was different on different days, seemingly due to the variations in the temperature of the platinized plate or gauze through which the vapors of the wood alcohol, in this form of generator, are made to pass. The solid preparations, the pastils, gave like results, as regards the wide variations in the amount of gas produced.

Prof. Robinson, Chairman of the Committee of the American Public Health Association on Disinfectants, in a recent report, suggests that the different results of different observers may be explainable, in part, by the fact that the distribution of the gas is much influenced by air currents, so that a current of air entering or leaving a room, or a projection or hanging, by deflecting an air current, may prevent the formaldehyde from coming in contact with some of the bacteria used in the experiments. This could hardly explain the failure to destroy bacteria placed in various parts of the room. Prof. Robinson says that the amount of gas must be large and the time of exposure long; and that most of the apparatus fail in generating a sufficient quantity of the gas.

Prof. Burrage, of the Purdue University, recently reported some experiments he had conducted in a room in a hospital at Boston. Every care was taken to secure favorable conditions for using the formaldehyde. The Trillatt autoclave, the autoclave of the Sanitary Construction Company, the Robinson generator, and the Moffat lamp, made by the Eli Lilly Co., were used. The first two make use of formalin and salt, the two latter of wood alcohol. A number of varieties of bacteria, including that of diphtheria, were exposed on surfaces for six hours. Repeated trials failed to destroy all the germs exposed.

Dr. Reynolds, Health Commissioner of Chicago, reported at a meeting of the American Public Health Association, held in Philadelphia in October last, that his department had made tests of all the following apparatus:

The Hollister lamp, made by Truax, Green & Co., using wood alcohol.
The Kny lamp, made by Kny & Co., using wood alcohol.
The Robinson lamp, made by Sargent & Co., using wood alcohol.
The Moffat lamp, made by Eli Lilly & Co., using wood alcohol
Autoclave lamp, made by Fries & Bros., using formochloral.
Generator lamp, made by The Sanitary Construction Co., using formochloral.
Disinfector lamp, made by Schering & Glatz, using paraform pastils.
Generator lamp, made by Boydson, using special compounds.

They were first tried under the best possible conditions; and in these trials every suggestion, made by experts representing the apparatus used was followed. The bacteria were on the surface of moist culture media, dry, solid surfaces, or on textile fabrics. Various pathogenic and non-pathogenic bacteria were employed. Disinfection failed in most of the experiments, and Dr. Reynolds says "no good results were obtained in less than eight hours." An important point is his statement that "all experiments failed when the temperature was below 60 degrees F." He added, that Chicago is still using sulphur fumigation.

The Journal of the Boston Society of Medical Sciences, for this month, gives an account of some experiments with formaldehyde, conducted by Dr. Harrington. He was successful in getting good results with formalin, when used in an autoclave or in an open cylinder heated over a gas stove; also by the use of pastils of paraform. Bacteria on objects wet or decidedly moist, however, were often not destroyed. His conclusions are as follows:

1. Formaldehyde has extraordianry power as a surface disinfectant.
2. That its penetrating power is slight.
3. That it cannot be depended upon in the presence of abundant moisture.
4. That for all practical purposes it must be regarded as a surface disinfectant only.

Dr. McShane, Health Commissioner of Baltimore, recently reported the results of a series of experiments made under his supervision. He used Schering & Glatz's formalin disinfector, with the pastils of polymerized formalin. His results were entirely satisfactory. In a room of 1,248 cubic feet of air space, using seventy-five pastils, he succeeded in all his experiments in destroying the germ of anthrax, typhoid fever, diphtheria and tuberculosis, even when enveloped in several thicknesses of cloth. Other experimentors have reported most favorable results in the use of formaldehyde.

It would appear that formaldehyde, in sufficient amount, and under favorable but still debatable conditions, will destroy all disease germs. We have every reason to expect that these conditions will soon be known, and that apparatus for successfully generating and applying the gas will be within our reach. But for the present I would say to the practical health officer who is, or is thinking of using formaldehyde as a disinfectant, what our present illustrious president said to Congress on the Cuban question—"Wait."

Dr. Kitzmiller, Piqua: I have had quite a little experience with diphtheria. Our city passed through an epidemic five or six years ago, and at that time we fumigated with sulphur, according to the instructions of the State Board of Health of Ohio. We have had diphtheria in Piqua continuously for over two years, not very much of it except at one or two times, but we have always had a little, and the past six months we have passed through quite a little epidemic, as Dr. Probst is aware. Commencing about the first of August, I began the use of formaldehyde gas, the generator made by Eli Lilly & Co.. consisting of four burners; and I want to say this, that sometimes when I have treated a patient and he is cured, I don't know whether I cured him or not. In regard to this fumigation, when I used sulphur we had no more cases in that family. Perhaps they had four or five other children, and I felt that sulphur was a good thing, but I want to say this much for the gas: I have had as great success in fighting diphtheria with formaldehyde gas as I ever had with sulphur. I have fumigated perhaps eighty houses, between eighty and one hundred and ten rooms, where we have had diphtheria and scarlet fever, and I think that with one or two exceptions it has certainly done as well as sulphur in my hands. Maybe if we got down to the bottom of this thing there isn't very much in fumigation, but I am a believer. We think a good deal of formaldehyde at Piqua. While we had a great deal of diphtheria three months ago, we have to-night two cards up in the whole city to represent the convalescent patients. We hope very soon now to get rid of diphtheria.

Dr. Cossitt: I would like to ask the gentleman who just spoke how they use the formalin or formaldehyde. We have used the formalin pastils, and use from fifty to seventy-five pastils to 1,000 cubic feet, and I would like to have an idea as to what amount is correct, what he considers a sufficient amount to destroy these germs.

Dr. Kitzmiller, Piqua: I have followed the directions of the Eli Lilly & Co., whose generator we use, burning wood alcohol, and I believe that it does the work. For a room of 1,500 cubic feet his directions are, I believe, one hour and thirty-nine minutes to burn it, but I burn it two hours or two and one-half hours. I try to give it a good dose, and as I said before we have good success.

Dr. Bonner: In reply to Dr. Probst, I would like to say that in a certain city in the state of Ohio, where they once had smallpox, a consultant was called in and the man said: "We will wait and see whether it is smallpox," and while they waited the patient died. Now it may be that while we are waiting for the facts about formaldehyde our patients will die. We had one of Lilly's generators, four burners, and used it two months, and came to the conclusion that it did not generate gas fast enough to do the work, and we now have two of his machines that consume a pint and a half of alcohol per hour, and I think if Dr. Probst would stay in the room where it is working he would be satisfied that it would destroy the germs.

Dr. Gilman R. Davis, Ironton: Dr. Probst has spoken about the Schering, Hollister, Moffatt, and other lamps, and I want to say that a great deals depends on the cost of these lamps. The Hollister and Moffatt lamps cost $6 each, and the fumigation of an ordinary room would cost 20 cents. The Schering lamp costs $1.50, and it burns formalin pastils, and for an ordinary room will take two boxes at 25 cents. A cost of 50 cents to a room will be quite an item in the course of a season's work in fumigation. Dr. Ohlmacher, of the Epileptic Hospital at Gallipolis, wrote to me a month or so ago about a lamp which he had invented, consisting of an ordinary tin spirit lamp you could buy for 50 cents at any tinner's. He puts a diaphragm of asbestos above the flame, cutting a hole for the burner. Upon this he rests over the flame a tube of asbestos two inches in diameter, six inches long, with air-holes cut at the bottom for a draft, and in the center of this tube the flame burning wood alcohol. He frays or "fluffs" out the asbestos, making a tumbler of this material, which he claims is as effective as the platinum in the regular lamps, claiming this will generate formaldehyde gas. I wrote him, and asked him if he really destroyed the germs, and I have never heard from him on this subject. I would like to have Dr. Probst state whether he knows anything of the Ohlmacher lamp.

Dr. Probst: Mr. President, I do not believe Dr. Ohlmacher has any lamp on the market. He is the bacteriologist at the Gallipolis Hospital, and a few weeks ago he showed me a lamp he had designed that would generate formaldehyde gas. He used an ordinary spirit lamp, and was undoubtedly generating formalin; they had used it for disinfecting purposes there. That spirit lamp would hold less than half-a-pint of wood alcohol. It seems to me that the amount of formaldehyde gas you generated must be taken into consideration.

Dr. L. F. Laudick, Lima: We started out to investigate that article last spring. A year ago, while we were in session here, we had a very nice article read to us upon that subject, very practical it seemed to be and very plausible. Now Dr. Probst comes around here and reads a letter that almost takes the starch out of us, on formaldehyde gas, but we are using it. I believe we are using the Hollister No. 3 generator. We had no lamp at that time that would consume sufficient wood alcohol in a reasonable length of time. They are trying to get a lamp by which they can disinfect a Pullman palace car in thirty minutes, and it would amuse you to see the different lamps they were experimenting with. Mr. Hollister had a lamp there that was on a base as large again as that pan, and it would hold a gallon and a half of wood alcohol. He only had one burner on it. I suggested that he put on three or four burners, which he did, and I purchased one of these; had the first one made. The lamp, I believe, sells at $25.00, and it will consume, I think, at least two pints of alcohol in an hour. It has a very large burner, and three burners in operation at once. We have disinfected not less than 200 houses in less than four months. Had quite an epidemic of diphtheria, something over two hundred cases in the past four months, and yet we have not had a single case recur in a house we have disinfected, except one case, and that case came home from school, was brought from Indiana. We have had splendid results, and personally, and from the experience we have had, I think I shall continue to use formalin gas until I find something better.

Dr. Schueller, Columbus: All we have heard here in reference to formalin and formaldehyde is nothing more nor less than speculation, theory, and not much that is really practicable. In our city, Columbus, my predecessor, Dr. Kinsman, used sulphur, and it seems to me with good effect. Last year Professor Bleile read us a paper on formalin, and recommended the discontinuance of the use of sulphur, and the effect seems to be just as good. During the last few years in this city we have had no serious epidemic of any contagious disease. We have had diphtheria and scarlet fever well under control. Now, whether this is the effect of fumigation with sulphur or of formalin, I do not know. I think most of these questions would be very simple. As I understand, many of the health officers here have used this for the last year or so. Now, if they would keep on, and when the room of a typhoid fever or scarlet fever patient is to be disinfected, have a piece of muslin infected with the germs of the disease and have it exposed in the room; then make culture tubes and see what effect the formalin has on the germs, and if these have been killed, I think the others which may be hid in the room would be killed too; and it would be a good thing if the health officers present would work out a plan of this kind and report next year, and then we would know something real and know some facts.

Dr. W. W. Ensey, Dayton: I would like to ask Dr. Probst whether he would recommend the adoption of sulphur as a disinfectant rather than formaldehyde.

Dr. Probst: I am placed in the position of defending sulphur and against formaldehyde, but I think my paper will not bear that out. I distinctly stated that formaldehyde is a valuable disinfectant. I firmly believe it is going to be our disinfectant, but the position I take is that the various lamps on the market have not yet proved themselves satisfactory in all cases. We must have a doubt in our minds whether we have or have not disinfected certain rooms. As to the particular lamps, I would state that they are about on a parallel. I do not consider that sulphur fumigation is an ideal disinfection. We have failures there, and you will probably have some failures with formaldehyde. I say, before we adopt it without thinking what we are doing, we ought to know more about it. You will find lamps on the market that are evaporating no more than a pint of wood alcohol, and may be taking three or four hours to do it, and because you get a strong smell in a room, health officers are too liable to take it for granted that they have disinfected that room. Undoubtedly by a year from this time our position will be definitely defined, and as I said in my paper, I have no doubt that we will have generators that will enable us to satisfactorily use formaldehyde. I know of no such generators now.

Dr. Williams, Niles: A short time ago I was called to treat two cases of diphtheria. The two children got along very nicely. I recommended sulphur fumigation. The lady had a brother that is a physician down in the southern part of the United States some place, and he wrote to her that she must disinfect with formaldehyde. I told her it was all right. They had three children, but one was visiting at her brother's at this time, and a few days later he returned home, and just seven days from the time he returned home I was called to treat him for diphtheria. I have treated many cases of diphtheria and scarlet fever in our town and have used sulphur entirely, and haven't had a return that I remember of in the same family. But most all families fumigate their houses by putting a teaspoonful of sulphur on a shovel and carry it through the house. When I fumigate, I use not less than three pounds to 1,000 cubic feet.

Dr. Kirkpatrick, London: I think from what the paper has brought forth we are to consider three things in regard to fumigation: The first is, that we must have the room at a certain temperature; that we must not have any drafts, have it perfectly air-tight, or as nearly so as possible; that there shall be no dampness, if possible in the room. The doctor spoke about fumigating with sulphur. We must use enough so that we know we are doing some good. I believe, Mr. President, the use of formalin or formaldehyde is better than sulphur, provided we use the same precaution and the same amount.

Dr. Cossitt, Conneaut: I asked the question previously as to the amount of formalin. We have Schering and Glatz's lamp, four burners, and I would like to know what is considered a proper number of pastils to burn per thousand cubic feet. We have been burning, as I said, fifty to seventy-five to the thousand cubic feet, and I was asked what my opinion was as to formalin, and I said I knew nothing about it. One of my missions to this meeting was to find out what amount of formalin we should use to be safe, what would be the equal of four pounds of sulphur in one thousand cubic feet. In burning sulphur, we burn four pounds to the thousand cubic feet for diphtheria, and for scarlet fever three pounds. Our people complain in burning sulphur that it spoils their clocks and machines, and that all bright surfaces tarnish. What I want to know is how much to use to be safe, and if there is anybody who can enlighten me on the subject I wish he would do so.

Dr. Probst: I quoted in the paper some experiments made by Dr. McShane. He found that it would require seventy-five pastils to destroy all the germs in the room which he examined, and that room contained 1,248 cubic feet, or it would be between 65 and 70 pastils for each 1,000 cubic feet.

The President: The next thing on the program is the discussion of questions.

Question: Do you consider that the common wooden drawers placed under closets are any safer than those closets that have none?

H. Beistline, Shelby: There are a number of places where they have put drawers, wooden boxes under privies. They are put in for the sake of convenience to clean them, and I asked the question, are they safe? There are very few that I know that are water-tight. Does anyone consider these safer than if there were none there at all?

Dr. Miller, Massillon: Do I understand the gentleman's question: Are water-tight boxes on the surface of the ground under a privy safer than simply to have a privy without a box? I should say not. I believe it would be safe for most everybody to just let the air in. If you would use dry earth in your boxes, or something of that kind, it might prove safe; but I understand the gentleman contemplates simply a box to contain the excretions, and it is intended simply for convenience in removing.

Question: Can a local board of health compel vaccination?

Dr. Probst: Mr. Chairman, in answer to that question, I would say no board of health can enforce vaccination except in the presence of an epidemic of smallpox.

Question: Garbage on streets, whose duty to regulate, council or board?

Dr. Schueller: In my opinion the board has to look after the cleanliness of the streets, and the city council has to furnish the money to remove the filth.

Question: Can a board of health file a bill for removing night soil?

Dr. E. Martin: I will say, Mr. President, that in Norwalk we do that. I do not know whether we have any right to do it, but they pay their taxes and they get their vaults cleaned.

Question: Do you claim a man keeping one cow and selling milk should be under the same rule as dairies?

Answer: I think he ought to. I think wherever the milk is sold outside of the family that keeps the cow, that cow ought to be inspected.

Dr. Waters, Marietta: I would like to ask a question in connection with that. We have down in Marietta a hotel that keeps three cows. There is no milk sold, but it is used at the hotel. Where do they come?

S. D. Brobst, Niles: I presented that question, and the reason for doing so is that we issue permits to our milkmen and we don't serve them the same as the dairies. What I want to know is whether we have authority to do that?

Dr. Kahle: I think there is no question, but you have authority to inspect the dairies or the premises where but one cow is kept.

Mr. Brobst: Can we charge the same permit for keeping one cow as we do a man keeping a dairy?

Dr. Kahle: It seems if a man sells milk it makes no difference whether he has one or ten.

Dr. J. W. Russell, Tiffin: Is there any objection to inspecting a man's cow whether he sells milk or not? If you heard of a man in any part of the town that you believed had a cow not in a healthy condition, is there any objection to going there and investigating from a health standpoint? And as regards the issuing of a permit, I would like to know how many charge for permits. We have to issue a good many, and I would like to know how many do charge for them?

Dr. Davis, Ironton: If a man is selling milk from one cow, I would inspect that cow just the same.

Dr. Cossitt, Conneaut: Do you want further questions for discussion?

Mr. President: Yes, sir.

Dr. Cossitt: In regard to plumbing inspecting, we have had a little trouble in Conneaut. At the time we appointed a plumbing inspector, he wasn't in the business for himself at all, and since he has become a plumbing inspector there is another man who came into the town and done some work, four or five or six jobs that were very poor work, and the plumbing inspector ordered these jobs repaired. Before the time for him to report on these jobs to be repaired, this man had taken him in as a partner, and the other plumbers say now that it was a little cheaper to take him in than it was for him to fix the plumbing. We have every confidence that the plumbing inspector will make him right the work anyway. He is a journeyman or master plumber. Is it right that he should hold his office as plumbing inspector, or what are we to do.

Dr. W. A. Daugherty, Bucyrus: I do not think I need to tell you that this plumbing law has been a failure. It has failed to meet the purpose for which it was enacted, and we want it modified. The reason it was declared unconstitutional was because it discriminated between individuals and members of a firm in regard to an examination. In Bucyrus, where I live, we have been having trouble in regard to this plumbing law. We think it better to have an examining board appointed by the Governor or someone else; have a new law similar to our medical law, so all plumbers can take the same examination before an impartial board, a thing you cannot have in a small city like Bucyrus. For instance, we have two practical plumbers in the city, and they are two plumbers to examine themselves. It has been a farce and a failure there, and that is the reason that we think it is preferable to have an examining board. We hope the Supreme Court will declare it unconstitutional. I wish to offer the following resolutions :

WHEREAS, The law enacted by our legislature in April, 1896, to regulate sanitary plumbing in the State of Ohio, has been declared unconstitutional ; therefore,

Resolved, That we, the officers and members of the State Board of Health and local boards of health, now in session, do hereby recommend to the legislature that it pass a new law requiring the appointment of an examining board similar to our present medical board ; and

Resolved, That our State President, Dr. T. C. Hoover, and State Secretary, Dr Probst, present these resolutions to both houses, and urge the passage of such a bill.

Dr. Cossitt : I second the resolution.

Dr. Schueller : Here in the city of Columbus we have had trouble for the last two years, for ever since that law was passed the plumbers have been kicking and fighting, and while our police court has not considered it unconstitutional, it was considered not a proper law and we could not do anything ; and to-day the plumbers who did not pass the examination are working just the same as those who did pass it. It would be well that we take action on this resolution at present, because under the rules the legislature of Ohio has biennial sessions, and if we do not bring it before the legislature this winter we will have to wait two years.

Motion carried.

Question : Is it not the duty of boards of health to prevent the use of milk from diseased cows ?

Dr. Kahle : I think that can be answered by one word, yes.

A. M. Turner, New London : I would like to ask one question in regard to a nuisance. After the health officer has notified an individual to remove a nuisance I wish to know if the local board of health is compelled to send a citation to that person and bring him before the board to give reason why he should not remove it before they can proceed to remove it ?

Dr. Laudick, Lima : I think in regard to night soil it can undoubtedly compel him to abate it as a nuisance, and if he does not do it, cite him to appear before the board and give reason, and if he had no reasonable excuse you can go ahead and do it and charge it up and collect it as taxes. It has been done and can be done again.

A Member : The gentleman misunderstands the question; the work has been done for two years.

Dr. Laudick : Who paid for the work ?

The Gentleman: Nobody paid for it.

Dr. Laudick: How was it done?

The Gentleman: By a scavenger.

Dr. Laudick: That is a private contract. You will never get anything out of him.

Dr. Daugherty: The law says you must make it out a nuisance, and then notify the owner of the property to clean the vault, and give him so many days to do it, say six days; the seventh day give him a second notice to appear before the board and give his reason for not complying with your request. If he fails to appear, go on and have the work done and collect it as taxes.

Dr. C. L. Fishback, Magnolia: I have a friend at Magnolia that lost a child at Los Angeles, California, January 23, 1896, and he wants to know if he can bring the child home at this date.

Dr. Probst: What was the cause of the death?

Dr. Fishback: The child died of diphtheria.

Dr. Stanton: I do not think we ought to take up this question until we have finished the question that we have on hand. I would like to call the attention of the gentleman to section 2128 of the Revised Statutes. It covers the case entirely. If they will proceed according to that section of the statute they can place the charge upon the tax duplicate and have it collected by the county officials.

Dr. Probst: In answer to the question about bringing the body from Los Angeles, I will say that, under the present rules of the State Board of Health, he could not do this at the present time. The question of revising the rules is being considered, with the expectation of framing them so that it can be done.

And thereupon a recess was taken until 7:30 P. M. of same day.

EVENING SESSION.

Dr. Kahle, as chairman of the meeting, called the convention to order promptly at 7:30, pursuant to adjournment, and introduced Dr. S. P. Wise, of Millersburg, to present a paper on "The Evil Results of Present Educational Methods."

THE EVIL RESULTS OF PRESENT EDUCATIONAL METHODS.

By S. P. Wise, M. D., ex-Member State Board of Health, Millersburg.

In order to avoid all misapprehensions, I desire to say that whatever criticism of our present school system I may give utterance to, will not be given in a spirit of hostility, but solely with a view of calling attention to that part of the school regime which in my opinion is causing positive injury to the pupils. Nor is it my purpose to detract in any manner from the ability, efficiency or honesty of purpose of the teachers who are engaged in our public schools. I have no doubt the vast majority of them are conscientious in their calling and should not be held responsible for the results of a pernicious system which is laid down for them to follow, and which they are powerless to change.

The question whether our present system of school education is consistent with good health, or whether it is injurious to the physical and mental well-being of the pupils, is certainly a question of supreme importance. Yet school hygiene in so far as it relates to the training and development of the mind and the laws of mental health is the least understood and the most neglected of all the various departments embraced in the field of sanitary science. Why there should be so much apathy and indifference in regard to a matter of such vital importance, can only be explained under the assumption that the people have implicit confidence in the American educational machine, and take it for granted that the system which has been formulated and is constantly being modernized by our educators, is as perfect as human ingenuity and superior intellect can make it. Whenever a child breaks down in school the failure is attributed to ill health, or to some constitutional defect. The fact that the majority of its fellows bear the strain and burden of school life with apparent impunity, is regarded as sufficient evidence that its invalidism is due to physical or mental inferiority. Unfortunately, the theory of the survival of the fittest does not apply in this instance—rather the converse is true, and it is usually those possessed of the most delicate nervous organization and the brightest intellects who first succumb to a cruel system of brain-forcing.

The youth of the present day are living under the reign of the schoolmaster. There is a morbid desire on the part of parents to have their children go through an extensive curriculum of studies, many of which can never be made available for any purpose in life. It is a system of education which does not educate, but which leaves the mind befogged with a multiplicity of ideas, not one of which they clearly comprehend. That it falls short of the purpose for which it is designed, is, however, the least of its faults deserving condemnation. The fact that the pupils are all obliged to conform to one uniform standard of cast-iron rigidity, and that studies are crowded upon them far in advance of their brain development is an outrage and a crime against nature. The evil results of such a course can scarcely be overestimated. A sound mind in a sound body is an often-quoted old adage, but it is equally true that the body cannot remain sound very long if the brain is kept in a constant state of exhaustion by severe mental strain and overwork.

In casting about for information on this subject I found everybody willing to admit that the studies in our common schools are too numerous, and the tasks entirely too severe for the pupil of average intellect; and that they are opposed to the pernicious system of cramming which is now universally in operation. Yet there seems to be no effort made toward correcting the evil, but to the contrary, year after year new studies are added and new burdens heaped upon the defenseless pupils, without a thought to the irreparable damage that may result. Parents give no attention to the matter so long as their children present a report of good grades, and when they fail in doing so the blame is placed upon the pupil, and quite frequently upon the teacher. It never occurs to them that there might be somthing radically wrong with the educational institution. So the machine keeps on at the same rate of speed, and the merciless brain-prodding continues. It matters not how weary the feeble child becomes so long as the robust are not tired. He must keep pace with the rest. The jaded, nervous system cries out in vain. His face looks pale and haggard. Yawn follows yawn; his head may droop and his eyes may close from sheer exhaustion; but the goad is applied, and he must arouse himself, for there are more lessons to be recited. He is restless at night, and moans and talks in his sleep, often repeating portions of the lessons he had worried over during the day. His parents are pleased to know that he is so thoroughly absorbed in his studies. If they could realize the truth they would know that he is consuming his brain capital instead of his brain income. Is it strange that headache and nervous prostration and insomnia, and St. Vitus dance, and epilepsy, and even utter extinction of mind should result from such inhuman and senseless abuse? In response to an inquiry on this subject, addressed to a number of my medical friends, the consensus of opinion was that the pupils in our public schools are overworked, and numerous instances were cited in which the victims suffered serious impairment of health in consequence thereof. For instance, a little girl nine years of age was brought to a physician for advice and treatment. She was pale, thin and very nervous, and had constant headache. The muscles of her face twitched constantly, and she could scarcely keep her feet and hands still. She was in the incipient stage of chorea or St. Vitus dance. In answer to the question as to the number of studies she was pursuing at school, the fact was elicited that her daily task consisted of eight studies—spelling, reading, history, arithmetic, geography, language, physiology and drawing. Deducting the time she ought to have slept, and the time required for her meals and toilet, and going and coming from school, and the time occupied in her recitations, she had about six hours left to study eight branches of learning. Now suppose either one of you ladies or gentlemen, who have mature brains and trained and experienced minds, should try to study eight unfamiliar subjects of knowledge in six hours, and were compelled to do this five days in the week, and then forsooth be expected to turn out cheerful and bright with a well-prepared Sunday school lesson on Sunday morning. I think you would soon be in the most abject state of mental confusion. You simply could not perform the task.

In addition to the multiplicity of studies, we cannot overlook the enormous, absurd and unreasonable character of the questions that the pupils are often required to answer in their respective branches of study. To illustrate, the following are examples of questions taken from the lessons of children from eight to ten years of age:

1. Spell and define forty words taken from Webster's dictionary.

2. Write the names of all the bones in the human body, spelling them correctly.

3. Bound the United States and give the names of all the states in the Union; bound Ohio and name all the counties; bound this county and name the townships; bound the township you live in and give the number of school districts in the township.

While investigating this subject, I asked a little girl how far her class was advanced in physiology. She replied they "had studied the bones and would soon finish the joints." Rather a grewsome study for little girls, indeed! What good they will ever derive from a little smattering of anatomy goes beyond my comprehension, unless it would be to prepare them to give testimony in a Luetgert trial at Chicago. How much more useful and practical it would be to teach them the anatomy of fowls and have them to learn how to carve them?

One of the greatest mistakes in our present system of educating children is that they are given too many subjects to study at once. The power of dissociation—that is, of keeping one subject entirely clear of another subject—is not great in the minds of children. The result is, that when they are through with their daily tasks they have a mass of confused ideas which it is difficult and sometimes impossible to separate one from the other. The instances are extremely exceptional in which a child can concentrate its mind on eight or ten different subjects in one day, and if it attempts to do so the brain is liable to be injured by the effort. It is a difficult matter even for adults to form and maintain clear ideas of several subjects at once. For this reason it has been found advantageous to extend the time of study, and reduce the number of branches which students were obliged to study simultaneously in our medical colleges. Experienced medical teachers recognized the evil results of trying to make doctors by the forcing process, and no doubt the quality of the future product will confirm the wisdom of the change.

The education of many of our eminent men was obtained at the village school where they learned but little more than the three R's, but they learned those well. As a rule, they were well-grown children before they entered school, and were in robust health, their physical forces not being deteriorated by want of bodily exercise,

They obtained a thorough knowledge of the branches taught, not because of any superiority of brains over the children of the present day, but because their minds were not tortured with numerous subjects to be learned, and they were not goaded by the system of emulation and competition which prevails in all of our schools at present. It is the history of many of our greatest scholars that they had reached the maturer years of youth before they made rapid progress in their studies. When they arrived at the age at which predilictions were formed, they knew exactly what they wanted to learn, and they entered with ardor upon the course of study they had selected for themselves. Many of them were obliged to labor for their own support, but they devoted every moment they could spare from their labors to their studies, and often consumed the midnight candle in the pursuit of knowledge. One hour of this kind of mental work with a brain near its full development, is worth more than days of forced application at the tender age when the brain needs all its force for natural growth, and consequently mental effort soon becomes confusing and painful.

Another great fault with our method of education is that there is too much learning by rote, without there being any understanding of the subject studied. This is notably the case in the study of grammar. Professor W. A. Hammond, a well-known author on nervous diseases, says: ' Grammar should be banished from all schools, except perhaps from the senior year of a university course. No child ever learned to speak good English from studying grammar. It has driven many a poor little wretch into headaches and nervous troubles. It is the most ingenious device for forcing an immature brain into early decrepitude, that the cunning of man has yet devised. The only reason why it does not do more harm is that not one in ten of the pupils that come out of our schools know anything about it."

The chief object with the majority of branches taught seems to be to develop the memory at the expense of the other mental faculties. Now psychologists tell us that the memory is one of the lowest faculties of the mind, in fact it is not a faculty, but simply the result of the registration of impressions. It is the property of certain parts of the brain substance, and is sometimes found to exist in the highest form in persons of low intelligence, being exerted automatically, as it were, without reason. When we analyze the faculties of the mind and consider mental operations from a scientific or psychological standpoint, it becomes manifest that if the preceptions and the power of mental concentration are cultivated the memory will take care of itself. The brain of the child is immature, especially in the portion concerned in the elaboration of the higher qualities of the mind. His mental powers are almost entirely limited to that portion of the brain which has direct relation with the organs of especial senses. His ideas are all evolved from his perceptions, and the exercise of the perceptions is purely physiological and is conducive to healthy cerebral development. A careful observation and study of the child from the early days of infancy to advanced childhood, teaches us nature's methods in the process of mental evolution. When the child is born the brain is only so far developed as to be the seat of an impulse to obtain nourishment. By and by consciousness appears, the child begins to hear, feel and see. From this time forth the infant is in constant pursuit of knowledge. He looks at every object with inquiring eyes and, if possible, takes them into his hands so that he can get fuller ideas of them. The first faculties of his mind that are brought into action are the perceptions or senses, the special organs of which are the eye, the ear, the nose, the tongue and the skin. During the early years of infancy and childhood development of brain goes on rapidly. This development, it must be remembered, is not a mere growth, but a constant unfolding of latent powers, a continual progress into a higher and higher life. Any undue strain or worry, or any condition which interferes with the proper nutrition of the brain during this period of life. will arrest its growth and development and must necessarily impair its future usefulness. It is, therefore, evident that the laws of mental hygiene would demand that the child's education should be almost exclusively conducted through the preceptions for the first ten or twelve years of life. He should be taught to acquire knowledge through the use of his senses. His power of attention should not be worried by set lessons. His understanding should not be unduly spurred, nor should his memory be taxed. He ought to see some tangible result of his effort to acquire knowledge, and this can only be done by teaching him facts that he understands and recognizes to be facts. Montaigne says: "Too much learning stifles the soul just as plants are stifled by too much moisture and lamps by too much oil; for pedants plunder knowledge from books and carry it on the tip of their lips just as birds carry seeds wherewith to feed their young. The care and expense that we received from our parents in our education go for nothing but to furnish our heads with knowledge, but gives us nothing of judgment or virtue. We labor only to stuff the memory, but leave the conscience and understanding empty and unfurnished."

A brief consideration of the structure and histological elements of the brain substance becomes necessary, in order to understand the manner in which the brain is injured by excessive mental application. The brain is merely a mass of protoplasm in the highest degree peculiar and, as scientists say, specialized; i. e., set apart for a special function or office. Protoplasm is composed of ultimate compound, particles called molecules, each molecule being composed of a definite number of atoms. All protoplasm dies in its own action. When one of its molecules has performed its life act it dies, but the protoplasmic mass does not die. It does not even waste because, when a molecule dies the remaining molecules immediately set to work to take away the dead matter and to form a new living particle in the mould left by its removal. Now, it is plain how mental labor affects the brain. The production of every thought causes the death of a number of protoplasmic molecules. If the brain is in a normal condition the waste matter is removed, and the molecules are replaced by the process of nutrition as fast as they are destroyed. If, however, thought follows thought with such rapidity that no time is allowed for the reproduction of the protoplasmic molecules which have been destroyed by continuous mental effort, a deficiency is created—the new working units which are built up will not equal the number destroyed. Nature gives ample warning that labor must be desisted from long before such a condition is reached. A profound sense of weariness is the signal that the brain imperatively needs rest. If not too much work has been done during the day, and the process of destruction has not gone too far, a reconstruction of all that was destroyed will take place during the night's sleep, and the brain will be as fresh and perfect as it was before.

If, however, the work has been a little too severe, or the period of recuperation a little too short, the brain does not quite recoup itself and in the morning is a little less capable of effort. The loss may be so slight as not to be perceptible, but "it is the many mickles which make the muckles." Suppose there is a deficiency each day, and the process goes on for months and years? The result will be that eventually there will not be enough molecules left for labor, and a nervous breakdown ensues, with perhaps scarcely enough working units left to rebuild the mental machine. In the light of this knowledge it is not difficult to understand why cases of nervous exhaustion recover so slowly. A brain which is merely tired may have the power of forming a million atoms in a night, while a brain which has been consuming the capital, can perhaps only replace fifty atoms in the same time, so that years are required to replace its wasted tissues. Worse than this, the molecules which are produced by an exhausted brain are of a poor quality, hence it is that a brain which has been thoroughly used up will never recover its pristine power.

A clear understanding of the structural changes which take place in the brain substance as a result of mental operations, enables us to comprehend how a nervous breakdown can and often does take place in our brightest scholars. The precocious youth who is the pride of his parents, envied by his fellows and lauded by his friends, and for whom everybody predicts a great future, often turns out a mediocre in after years or even is an absolute failure in life's struggle. There is no doubt but that in many of those instances the brain has been arrested in its development, and its molecular reproductive force has been exhausted by overwork. The injury thus wrought in the young brain by excessive study may not be apparent at the time, but it is none the less real. There have been numerous instances in which the brain of the studious child has developed rapidly up to a certain age and then suddenly ceased to expand. This is a mushroom growth brought about by the stimulus of study and it is quite reasonable that its structure must be inferior in quality. In this class of cases the energies which should have been spent in normal development have been diverted to the needs of labor, and the brain has spent all its developmental force, so that instead of increasing in functional ability it is barely able to maintain its existence, and will always be a dwarfed and damaged brain.

It must be remembered that the brain not only furnishes force for thought and the other elements of the mind, but it is also the center of the nervous system, which keeps in action all the other organs of the body. If, therefore, the mind takes more than its share of nerve force, the heart, the stomach, the lungs, the muscles and the entire physical organization must suffer. Modern science is revealing more and more clearly that many affections of the different organs of the body are dependent on disordered nervous action. Many of the disorders of digestion and assimilation and the various diseases resulting from impaired nutrition are referable to this cause. We do not know how far pneumonia and other acute and chronic diseases have their origin in nerve exhaustion, but there seems to be a close connection between them. This is the most important problem that enters into the consideration of this subject. Whether we speak of the mental or of the physical, the years of school life constitute the most important period of our lives. There is no doubt but that excessive mental application, as well as all other gross violations of the laws of health, will bear fruit in after years in the form of disease which entails life-long misery or premature death. We have no means of knowing how many sufferers of this kind exist in every community. Many of the most distressing nervous diseases do not produce death, but after years of miserable existence the victim perishes of some disease that is not known to be nervous. Hence we can form no estimate of the number thus afflicted from mortality records. The history of epilepsy is often that of slow progressive failure of mental power until the unfortunate boy or girl disappears in the gloom of the idiotic asylum, finally to die of pneumonia or a fever. Often again, and these are the saddest of all cases, the mental warp is not sufficient for the asylum, but is enough to render miserable the life of the individual and to blast the happiness of the home circle. "Death is but one act in the drama of life," than which the living death, the perpetual torture of a nervous disease, is far worse."

One of the most potent factors in producing brain exhaustion in the scholars of our public schools is the emulation and competition which is so commonly in vogue. The artificial stimulation which is induced by monthly examinations, the result of which is expressed in a graded report to the parents, is in many instances injurious in the highest degree. What the brightest scholar can accomplish becomes the standard for the rest. The anxiety and worry and mental strain attending such a system does more harm to the immature brain in one month than a whole year of study without such emotional disturbance. Who has not seen the little ones crying over their reports as though their hearts would break, because their grades were lower than the previous month, and because, in their opinion, they had been unjustly dealt with. The most unfortunate feature in the matter is that the pressure falls the most heavily upon the anxious, earnest, ambitious and sensitive children, just the ones who would do all they ought without such stimulation.

The most reprehensible practice of all—which is in vogue in many schools—is that of deducting a certain per cent. from the child's grades for absence from any cause, sickness not excepted. The result is that children frequently hide their illness as long as possible, and when they are compelled to remain at home by order of the physician the disappointment and grief depresses their nervous system and militates against their recovery. I have known outbreaks of diphtheria to occur in schools as a result of children persisting in attending when they were afflicted with the disease, and the only reason for concealing their illness was that they could not bear to fall short in their grades. Punishment for sickness, ye gods! Who can conceive a more infamous, diabolical rule of discipline than this? A heathen despot, in his most tyrannical mood, could not devise a more cruel and inhuman regulation. The Americans are proverbially a nation of neurotics, and it is not surprising that we have gained the opprobrium when we have permitted a system of education which ruins the child's nervous system while at school. How can we expect a development into perfect manhood and womanhood in after years? The time will probably come when the people will realize that our system of education is faulty in the extreme, and will take steps toward placing it on a basis of good common sense. The light of intelligence is pervading all the affairs of mankind, and is dispelling ignorance, superstition and bigotry. Is it not strange that the great scheme of education has so far escaped, and that the college course of today consists of a curriculum which was originally devised for priests, and was their necessary training in the twelfth and thirteenth centuries.

It is a question, however, whether the reform will be effected in our day and generation. The fault lies almost wholly with the parents. They want the worth of their money. They demand the "pound of flesh" and educators are merely furnishing what the public demands. The vast majority of parents aid in the forcing process. As soon as the children return from school they are urged and often compelled to apply themselves to their studies until late at night, and the early morn finds them bending over their books. Little regard is had for either their physical or mental welfare, just so they stand well in their classes.

It is generally admitted that the highest results of the educational process is to be sought in the direction of a sound mind in a sound body. But the question is, Are the two compatible? Can they be united in the same person? Is it possible to possess both, or must one be sacrificed ere the other can be reached? Can we have the highest mental culture conjoined with the most perfect physical development? "Is it necessary to the highest mental development that it be accompanied by hollow eyes, sunken chests, weakened nerves, and miserable state generally that we sometimes see in those who have attained intellectual greatness?" Must the mind devour the body ere it can reach the fullest and broadest range of its powers? Are the fires of genius to reach their greatest brightness only as they are fed by the health and life of those in whom they burn so brightly? To these questions I believe a negative answer can be given, and that body and mind—the mental and physical educated—trained, developed aright, can grow up into the noblest type of perfect manhood.

Prof. F. S. Reefy, Elyria: I want to endorse much that has been said by the doctor. There is, however, much that has been exaggerated and that is untrue, as our own experience as a nation proves. If he is correct that we are educating the Americans to death, we should burn our school houses and raze our colleges and go back to the position of the Digger Indians and the ancient Romans and the ancient Greeks. It is true that there is over-study and over-work, but it is not true that our schools are a failure. Look around and see what we are made of! Our average physical development is quite as good as that of any other nation on the globe to-day, and we have come up through these different developments of school life, those of us that are here, we Americans. Go to Italy where they have no public schools and what do you find there. Do you find athletes, any physical development? No, you don't. One of our citizens a few years ago went to Italy and other portions of Europe, and I asked him when he returned, "What do you think of the Italians?" He said, "are those men, and am I a man too?" was the question that presented itself to him. The average Spaniard is not as good a man as the average American. Spain has no public schools. Italy has no public schools. Rome and Greece had no public schools. Were they greater than the Americans with public schools? No. We know better than that. I want to repeat that the result of American education is not a failure, although there are things that are wrong, we will admit that. Look our college boys over; look the average school boy over to day. He is not an imbecile intellectually. No, he is not. He is physically pretty fairly developed. What are those boys doing down below (referring to the Y. M. C. A. gymnasium in the basement). What is that thundering noise down below? Why, somebody said the boys are practicing athletics down there; exercising. Now, they are doing that in our cities everywhere. No, I want to repeat, we are not educating ourselves to death. There are some that are failures, but there are many that are born so, born physicially weak, and they cannot endure what comes. The worst of it is, perhaps, we are trying to educate the whole school in a certain channel. We cannot do otherwise unless we have a great many more teachers than we now employ. The most earnest men in our country are our country school teachers. I place them above every other class of men. They are making us great; our school houses are making us great. I will not except the church or any other moral institution. I tell you it is intellect that makes a man. It is intellect that makes American greatness, and I want to say to you that the day is past for us to come here and criticise the schools and the work they are doing as it was done here. I am willing to concede many things that the gentleman has presented are true. Go among the teachers, where they consider this subject as we consider our health subject here, and you will find an earnest, thinking class of men. Yes, gentlemen who are leaving behind a great many things that are complained of here as belonging to the past. The American people are the greatest people in the world to-day ; they are the greatest people physically and the greatest intellectually. If it were true, what is claimed here, that we are physicially deteriorating, then Digger Indians would be greater men than Americans. It could not be otherwise. The idea that we should not study our own language, only those that go to college, and then in the senior class. The thing is ridiculous in itself. The gentleman doesn't believe it himself. Would he be competent to come and read an essay so nobly written if he had not studied grammar and learned to parse? How is that? How is it that he knows how to express his thoughts in such noble English? It is because the schoolmaster has done his work well. Yes it is, gentlemen, that is the reason why. Suppose he hadn't studied language at all, so far as its construction is concerned, then where would he be? But I am taking too long.

Dr. T. J. Dillinger, Murray City: I voice the sentiment of Dr. Wise's essay in the main. Of course, like all the rest of us, he will say some things that somebody else won't believe. I admire the last gentleman, who has the pluck to stand with his face to anybody and say what he thinks. That is a pretty good trait in a man. I followed school teaching for quite a number of years myself, and I know that a great deal that Dr. Wise said is true. The children are crammed and stuffed with too much nonsense. There is too little of the practical education. It is imparted to the children to-day by rote. I have seen it in my own experience and in other schools that I have attended and visited. It used to be in days past that people thought that nobody but an orator had any use to study grammar, but grammar is common sense, classified knowledge ; and we find that it is no harder to learn than anything else, and any pupil with ordinary good sense can learn grammar in a very short time as easily as he can learn anything else.

Dr. T. Clarke Miller, Massillon: After listening to Dr. Wise's paper, for me to say anything about it is to establish a reputation for boldness. I presume that some of you have had experience similar to my own of hearing a remarkable sermon, a sermon which seemed to touch everybody in some way, something that they needed to think about, and the best thing they could do was to stop and think about it, and then some fool organist would get up and play the audience out of the room with a "quick-step." (Convulsive laughter and great applause.)

Mr. ——— ——— ———: While I do not, perhaps, agree with everything contained in the paper, it has presented some truths that we ought to think about as boards of health. I think boards of health ought to canvas boards of education. I do not believe the trouble lies in the teachers. I have had some observation of this, and I think that some boards of education in our country towns are altogether too ambitious in crowding into the curriculum of public schools too many studies. The high schools are so crowded with studies like English literature, science of government, algebra and geometry, and all these things, that the common branches have been crowded out. The children have learned to read, and as for spelling, very few of them can spell. I think there is a good deal of common sense in it. Doctors and lawyers and educated men manage to get themselves on the boards of education. Boards of health should simply extinguish some of our boards of education as nuisances.

Mr. W. L. Wear: I shall not try to criticise anyone, but I would like to ask Dr. Wise if he has ever taught school.

Dr. Wise: Yes, sir.

Mr. Wear: Did you teach in the country or town school?

Dr. Wise: In the country thirty years ago.

Mr. Wear: There has been quite a change since the doctor's time. I would say here on behalf of the public schools of the country that there has been an improvement since then, and this thing of ramming and cramming away to get through is a thing of the past. Dr. White, of Cincinnati, in his last pedagogy said that the most successful teacher will study the pupil, and as far as possible apply the work that he has for that pupil to do to that one pupil. The teachers, as a body, recognize that there is something at fault, and we simply ask this of everybody: Don't throw down the ladder that you have climbed up so nobody else can get up, but help us out. Give us a remedy, and we will willingly carry it out.

Dr. J. F. Marchand: I wish that the paper by Dr. Wise could be printed, and read by every intelligent physician in the State of Ohio. That paper will bear study, and bear the endorsement of a majority of the profession. It has been my fortune, or misfortune, to be engaged in educational work for a number of years previous to my entering the medical profession, and I think I can say that the cramming methods in the public schools is very much to be deplored. I have been in a position to see the work done in our city, and the examinations at the end of the year put me in mind very much of corn-fodder pushed through a cutting-machine, and on a certain day each one trimmed off even. Very little work can be done for the individual pupils of the schools. We must suit the work for the masses. But there is entirely too much imposed upon the little minds, and to those of us who profess to know something of the human mind, there is much in what the doctor says. Very certain it is that what the doctor has said is true in the main. So many of us are so accustomed to send our little patients to the oculists—and all honor to the oculists. We are entitled to their advice. They are entitled to a very prominent place in the community, as for as the general practitioners are concerned. Did you ever notice how many of the little children have glasses? Well, that is due to some correction of vision that is needed. Probably it may be brought about through the conditions that the doctor speaks of, hard study. I want to say that this paper is worth my trip down to Columbus, and I want to read that paper and study it.

Dr. Waters, Marietta: Mr. President, I would like to ask a question, that is if the board of health has authority to compel the school board to furnish seats of the proper size for the children? It is a live question with us. There are some of the school-rooms that have seats too high for the scholars, their feet will not touch the floor, and they complain of tired legs all day long.

Dr. Spencer, Dayton: I feel like saying something on this paper in regard to my own children. The doctor has, like a good sermon, brought conviction home to my heart. It has brought to mind forcibly a child of my own, nine years old, who is attending school. Without doubt, she understands the mental problems put to her each day, but on account of not being able to apply herself to them in the few minutes allowed, her report at the end of the quarter is very low. The teacher understands that the child understands the problems, but that the time allowed for that study does not give her time enough to solve them, and therefore her grade is marked down. The little girl comes home at the end of the month with her report and hands it to me with tears in her eyes, and I thought to-night, when I listened to that paper, that when that child comes home again I am going to take her up in my arms and try and relieve her of her trouble. I would like to study the paper. I believe it is worthy of study. There may be points in it that do not meet our views altogether. I have a daughter that was graduated from the high school, and I have felt that her whole school life has been crowded full all the time. She ended her school days a weak young lady, and I am now not allowing her to do anything until she has regained her health and strength, which was undoubtedly lost by this over-study. Without any effort on my part, she sat up at night to get her lessons, and she came out of school at eighteen years of age in some respects a physical wreck. I believe in the paper that has been read to a certain extent.

Dr. Schueller, Columbus: I have lived in this city for a good many years, and was a member of the board of education for ten years. I have had experience not as a teacher but as a member of the board of education. The fault doesn't lie with the schools proper, it doesn't lie with the teachers. It is the head of the school system. It is the superintendent who is at fault, and he is to be blamed for all the trouble in our schools. I have had some experience in these matters on the committee on text-books. It is always the superintendent who wants to put in new studies. "They have this study in Cincinnati and Cleveland and now we must have it," and of course the superintendent must know. He is an experienced man in school matters, and the members don't know much about it, some do and some don't, and we all vote for it. Of course we must have physiology, psychology, civil government, or whatever it may be, and that is the only reason why we have so many studies in our public schools. I am much more in favor of reducing the number of studies and going back to the three R's, as has been said.

Dr. W. E. Linden, South Brooklyn: This paper is valuable and certainly should be studied, and I will make a motion that it be printed by the State Board of Health and distributed to the local boards.

The President: That is unnecessary. This will be printed in the regular report and distributed in that way.

Dr. Linden: These papers of course are published in the proceedings, still these proceedings will not be issued in numbers sufficient to be sent to the local boards of health for distribution, and I should like to see this paper in pamphlet form and distributed liberally.

President Kahle: The motion is out of order. This paper will be published and circulated freely, and anyone who wishes can get a copy. There will probably be at least ten thousand copies of it printed.

Dr. Wise: I certainly thank you very much for the great appreciation of my paper. I do not desire to discuss it. I think all the arguments have been appreciated.

President Kahle: The next subject is "The Bacteriological Diagnosis of Diphtheria," by Professor A. M. Bleile, of the Ohio State University.

THE BACTERIOLOGICAL DIAGNOSIS OF DIPHTHERIA.

By Prof. A. M. Bleile, Ohio State University.

Gentlemen—It is now generally admitted that all contagious or infectious diseases depend for their cause upon a living vegetable growth, the bacteria. In fact, this view forms the working theory of all our health laws and of quarantine and care of patients suffering from such diseases. We know that these bacteria are living organisms, and that they fall under the general law which applies to all living bodies, namely: that there is no spontaneous generation of them; that they do not arise anew or of themselves. It follows, therefore, if we decrease the nidus or place of growth, their progeny, or new bacteria which might spread disease in other parts, will be taken care of as a matter of course, and in this, therefore, there has been an intensely practical application of bacteriology. Of late, the practical application has taken other directions. We make use of it now for the benefit of health officers in the way of bacteriological diagnosis, and not only for diagnosis, but also for determining the period of recovery, do we depend upon bacteriological examinations. In consumption or tuberculosis, and in diphtheria, it is maintained that we can make a very early diagnosis by the bacteriological method when possibly the clinical method would fail, and we can also establish what is almost as important a point, when recovery has taken place; that is, when the bacteria have disappeared from the patient.

I was asked to speak on the bacteriological diagnosis of diphtheria. In 1883, Klebs first described the bacillus now accepted as causing diphtheria, and the next year Loeffler fully identified this bacillus as the real factor in this disease, and we speak of it sometimes as the Klebs-Loeffler or as the Loeffler bacillus—a practice which is to be deprecated, however, since the calling of anything scientific by a proper name leads to more or less confusion, it would be right to speak of it simply as the diphtheria bacillus.

I shall not spend much time in describing the general characteristics of these bacteria. They are about as long as a tubercle bacillus, but thicker—fatter as it were. They are irregular in shape, and also color irregularly, and this is one of their chief characteristics and one upon which we really depend for their detection and identification. They may be spindle-shaped, lance-shaped, or of a shape which would defy description of even one gifted with a vivid imagination. They grow in the forms represented here (refering to the chart). These (indicating) in a medium of one kind, and these above (indicating) in a medium of another. They will grow in any of the media ordinarily used for the cultivation of such germs in bacteriological work. That is, in beef broth, in peptone beef broth, but they grow best in either agar with glycerine, or what is still better, in a blood serum mixture, that is, serum containing some grape sugar, as proposed by Loeffler himself. The appearances of their growth, or the colonies as they are called, differ somewhat with the medium that is used, and I will speak only of two, the glycerine-agar and the blood serum mixture.

In glycerine-agar the diphtheria bacteria grow very freely, but the little fields or colonies are rather difficult to see, as they present spots only that are somewhat drier and more glistening than the other parts of the surface on which they are not growing. Under the microscope the bacilli grown in this way look as they do on this side of the chart (indicating). You will notice that they are irregular in form no two alike, and you notice again, as represented, that they are stained in spots only. The aniline colors used for this staining are not regularly distributed through the body of these bacteria, as we find they are in most other forms.

In blood serum mixtures the colonies grow in a different way. They are usually china white, and of more characteristic appearance than in the glycerine-agar. In fact so much so that one accustomed to work with them can feel reasonably sure of their identity from the gross appearance only, without miscroscopic examination. Under the microscope they appear longer and more slender, as represented here (indicating), but we have the same irregularity of form and staining.

To come now to the value of all this for diagnostic purposes. Why cannot we make a diagnosis simply from the membrane without resorting to an extra growth of the bacteria? Because in examining directly from the membrane we find not only the diphtheria bacilli present, but there is quite a number of bacteria usually, some of which may simulate more or less closely the diphtheria bacilli, and if these foreign forms are numerous they might cover up the diphtheria bacilli to such extent that they could not be recognized even if they were present. For that reason diagnosis cannot be made direct from the membrane, but we must resort to the more roundabout way of making the artificial cultures as described, and as a consequence we have the diphtheria bacteria alone to deal with, and then a satisfactory study of them, if present, can be made, and their absence that is their failure to get a growth on these media, could also be properly interpreted. Theoretically this can be carried out, I am free to state, without a failure, but failure may be due to some defect in the method used.

I wish to meet a few objections which have been brought against this method of diagnosis, for like other new things it has met with opposition. It is very fortunate that new things always do meet with opposition, because it serves to give them a more critical study than they would otherwise receive, and their value becomes the more readily fixed. The objection urged is that pseudo-bacteria, which cannot be told from the real diphtheria bacillus, may be present, and that in this way the results of a careful examination would be entirely invalidated. True, it is a fact that we sometimes find in the mouth bacteria which, under the miscroscope, cannot be told from diphtheria bacteria, but the colonies which they form when grown on agar or blood serum are quite different from the real diphtheria bacilli, and will serve to distinguish between the two. As a further valuable feature of the bacterial method, it may be urged that the time of recovery of a patient can be fixed by this means of examination. because sometimes when the membrane has disappeared from the throat, when there is apparent recovery, diphtheria bacilli are still present. and may act as infectious agents.

It has been urged further that bacteria are sometimes found in the throats of persons not ill with diphtheria, which correspond, so far as their miscroscopical appearance as to shape and irregularity of color goes, exactly with the diphtheria bacillus, and yet tests made with these on animals show them to be harmless. This would not disprove that there are no real diphtheria bacteria, but that the diphtheria bacillus, like other disease-producing material, may become weaker, less liable to produce disease, or may even lose this liability entirely. It has become, as the technical term goes, attenuated. I may cite, as an illustration of this, the fact that we can take the anthrax bacillus, one of the most virulent bacilli known, and by simply heating and cooling them a few times pretty rapidly, so attenuate them that they have lost their poisonous properties.

As bearing further on the possibilities of mistaking non-disease producing bacteria for the true diphtheria bacteria, I may cite the work of Park and Beebe. They examined 330 healthy throats. In twenty-four cases they found the true bacteria, or at least bacteria showing all the characters usually attributed to the diphtheria bacillus, but when these were grown artificially and then tested, it was shown that they had lost their virulency. In twenty-seven cases they found bacteria which resembled, but only grossly so, the true diphtheria bacillus. In eight cases they found the true diphtheria bacillus as in the first twenty-four cases given, but the bacteria from these eight cases were virulent when tested for their effects on animals. but Park and Beebe concluded that these eight people must have been in contact with diphtheria patients.

Now, the outfit for diagnostic purposes may be gotten up somewhat like the following: We can use for the purpose of health boards either the glycerine-agar or the blood serum mixture, which one is used depending of course entirely upon the liking of the operator. Such a tube as this (indicating) Ishow you, in a box, is gotten up by the board of health of Columbus. Then this tube is accompanied by another one which carries a cotton swab. This cotton swab may be a twisted wire or a knitting needle, a little flattened on one end, around which a little plug of cotton has been wrapped. This to be put into the tube, which is to be plugged up and the whole thing then sterilized. Directions accompany the box, and they state that the swab should be removed from the tube without touching it to anything else. Rub it lightly over the membrane in the patient's throat or nose, and then it should be passed gently over the surface of the blood serum or agar in the other test tube, and this is then sent to the laboratory where it can be kept at the temperature of the human body, and in twelve hours a positive diagnosis can be made.

Various modifications, of course, of this plan have been proposed. I believe it is proposed to make one in the future work of the local board here. If these tubes are kept on hand and lie about in the drug stores as was the custom, they will dry out and become unfit for use. The future outfit is to consist merely of this tube (indicating) with a sterilized swab and is to be placed directly in the hands of the physician. The physician will pass the swab over the throat of the patient, then place it back into the tube and send it into the laboratory. Another advantage of this method is that not so many culture tubes will be spoiled by a too rough scraping of the surface, as has been the case heretofore. One drawback would be that it would take a longer time to get the culture tube inoculated, and this would of course lengthen by some hours the time in which the diagnosis could be made. No doubt other variations will suggest themselves.

The President: Gentlemen, the question is now open for discussion.

Dr. J. M. Withrow, Cincinnati: From some experience in Cincinnati, I desire to call your attention to some instances in which there seems to be a break in the apparently infallible method presented. Connected with the Cincinnati health department is a laboratory in the upper part of the same building as the health office. In this laboratory all the necessary equipment for conducting this and every sort of examinations is established. We have tubes similar to those shown, although we use only the sterilized blood serum with the swab in the separate tube, and these both slip into a wooden box with a lid, so they are practically imperishable. These are deposited or left at various stations in the city and numbered, and a record of the number of the tube is kept at the health office, so that after they have been left at the station for a period of three months they are called back, cleaned up, refilled and resterilized. These tubes are for the free use of practitioners in any part of the city, and they have been informed through the public press and circulars of their location. There are twenty-five or thirty stations in the city. Whenever a physican desires to make a culture he secures a tube from one of these stations, makes his culture, and then sends a message by telephone to the sanitary office, or brings the tube directly to the office; it is put into the incubator, and in a period of twelve to twenty-four hours the bacteriologist of the department telephones the result to the physician reporting the case and sending the culture. A very large proportion of the cases prove to be negative. A very large number prove to be negative when the clinical evidence of diphtheria is so manifest as to leave no question that they were diphtheria, and yet a bacteriological examination carried on in the manner just described has given a negative result. It is therefore wise to call your attention to the fact. The reason for this explanation was partly pointed out. In the first place, there are cases of mixed infection, and while the clinical evidence of diphtheria is so great that it cannot be gainsayed, still the bacteriological examination may prove negative. Another source of error comes from the fact that the physician, in applying the sterilized swab to the throat, will not do it with sufficient force, or will not chance to pick up bacteria in cases where the germs are few, so that many of these cases that are doubtful clinically, and are also demonstrated to be negative by the bacteriological examination, may prove really to be diphtheria. After some experience, therefore, with this method, it has been the habit of our department to allow the physician the right of judgment in every case at its beginning, although we are able to affirm or deny his diagnosis within twenty-four hours. We will quarantine the house and withdraw the children from school, if the evidence is clinically sufficient to make a diagnosis of diphtheria. We have an orphan asylum in Cincinnati which has had a severe outbreak of diphtheria. The source of the infection could not be discovered. The very best fumigation known to science was carried on after such outbreak. There were 102 children in the house; there were eighteen nurses and officers and domestics. I sent district physicians with as many culture tubes as there were people in the house, and cultures were made from all these throats, and they proved negative in every instance except two. These two were subjected to the further test of injecting guinea pigs. We are as yet in the dark. Since the examination was made a month ago, no further outbreaks have occurred.

Dr. Schueller: Mr. President, we in Columbus will in a few weeks have a bacteriological laboratory connected with the health department, and my plan is to carry out this bacteriological examination systematically; that is, have every case that is reported to the health office examined; then after the case has been reported to the health office, the sanitary officer has to go to the house and take the culture tube to the house, and leave the directions that the physician shall use the tube. The day following the sanitary officer will call at the house and take that tube away and bring it to the health office, to the bacteriologist, and he will make a culture at once. Then we will get diphtheria under control and get a record of every case. If we leave the tubes at the drug stores, most of the physicians will not go so many squares to get a tube and carry it to the patient and take it to the health office.

Dr. Probst: I understood Dr. Withrow to say that in the cases in Cincinnati the houses are placarded before a bacteriological diagnosis is made. In some cities, where they have bacteriological diagnosis of diphtheria, they are not placarded until after it is known from the diagnosis whether it is or is not diphtheria. Something is to be said on that side of that question. If a physician has his house placarded as soon as he reports a case, he wants to be very sure in advance that it is going to be diphtheria. It is rather humiliating if, having reported a case of diphtheria, a card is placed on the house, and after the bacteriological diagnosis the health department takes the card off the house. Some of our health departments are therefore allowing the physician to report the case at once to the health officer, a bacteriological diagnosis is made, and if it is diphtheria then the house is placarded. I should like to know, if Dr. Withrow will tell me, what his practice is in regard to removing quarantine? A case has been recently reported of a child that carried diphtheria bacilli in her throat for one year after apparent recovery from that disease. This was shown by weekly examinations.

Dr. Stanton: What is done in cases where the result is negative and the house is placarded? Is the placard at once removed?

Dr. Withrow: There is an aphorism of Victor Hugo that there is nothing so certain as uncertainty. You, who are making clinical diagnosis of diphtheria, are willing to admit the truth of the aphorism. You will also further realize, perhaps, that health departments and health boards will not succeed unless they receive the active co-operation and support of the medical profession. You must therefore recognize the medical profession as quite able in most instances to make a fairly good clinical diagnosis of diphtheria. We therefore say to them, in Cincinnati, that if they report a case to us as diphtheria, we proceed at once to placard the house. The culture examination is made after that; whether it proves positive or negative, the quarantine is carried on just as long as it would be under the circumstances of a positive bacteriological finding. In the case mentioned by the Secretary of the State Board, where we find, after a physician has announced to us a case of diphtheria, and we have placarded the house, that the bacteriological examination is negative, the placard remains just the same. We do not send our officer to the house, believing if the physician has been sufficiently sure clinically that this was a case of diphtheria, we had better be on the wrong side than let any of these children loose upon the community, or permit a general invasion of the houses. With respect to how soon after diagnosis has been made do we remove the quarantine? The rule in Cincinnati now is to permit physicians, or, in the event they desire not to do so, to send an assistant to the house to make a culture seven days after the case has been pronounced clinically well. If this bacteriological diagnosis is negative, the quarantine is lifted within three days. If the bacteriological finding is positive, we make another bacteriological examination after seven days, and immediately upon such second or subsequent examination being found negative the quarantine is raised. With respect to the bacilli remaining in the throat after the disease has been reported clinically well, I will say that, in cases four weeks and one six weeks, after the patient was pronounced clinically well, we have found active diphtheria bacilli. In this case the patient was subjected to a drenching of the throat with peroxide of hydrogen, and after that no bacteria were found. In such a case as suggested by Dr. Probst, however, I would want to determine whether these bacteria were active by making a culture test and applying them to animals.

Dr. W. S. Bookwalter, Miamisburg: From the discussion I am to understand that there is an uncertainty as to the diagnosis from a clinical examination. Again, from the paper and discussion I would understand that there is an uncertainty as to the bacteriological examination. If this be the case I would ask the question, by what means can we have any assurance of a positive diagnosis in diphtheria?

Dr. Bonner: I would like to ask Dr. Withrow whether or not in these cases antitoxin was used, and if so, how long after using it, did he find germs in the throat?

Dr. Withrow: In the case reported as having produced the germ from the bacteriological test six weeks after reported clinically well, antitoxin was used, and the physician believed that it had cured the case. Indeed, if antitoxin means anything it means antitoxin. Unless this assumption is granted we will be compelled to revise our teaching that a specific contagious disease is due to a specific germ always present. As it is evolved from the bacteria of diphtheria it would not therefore presumably be effective against any other poison than the poison made by the bacteria of diphtheria. In other words it would not be efficacious in a streptococcus poison.

President Kahle: Professor Bleile may now close the discussion.

Professor Bleile: I will take time to point out the fact that the method is *theoretically* infallible, but of course clinical diagnosis is also uncertain. I pointed out the fact that in carrying out the bacteriological method in practice there are errors of technique which will invalidate the result. It is to be assumed that in every case of diphtheria we have the Klebs-Lœffler bacillus. And, again, if there is the Klebs-Lœffler bacillus and if it is not at first found, it does not follow that the bacillus is not there. I am rather of the opinion, having had little experience in that myself, that where one examination fails to reveal the Klebs-Lœffler bacillus a repeated examination would surely bring it to light.

President Kahle: The last paper of the evening will now be presented by Dr. Josiah Hartzell, of Canton—"Inventors and Manufacturers of Health."

INVENTORS AND MANUFACTURERS OF HEALTH.

By Josiah Hartzell, Ph.D., Member State Board of Health, Canton.

More than fifty years ago Dr. Benjamin Rush, of Philadelphia, one of the prophets of sanitation, foretold that in the coming time a case of typhoid fever would be followed by the arrest and punishment of those to whose negligence the case was attributable. A few weeks ago Mrs. L. B. Green, a widow in Ashland, Wis., whose husband had died of the fever, sued the city for damages. Her claim was that the disease was due to infected drinking water from the public water supply. The jury decided that her complaint was just and gave her a verdict of five thousand dollars.

Assuming that this was a just judgment what does it imply? The plain meaning of it is that in the opinion of that jury clean water produces health, and polluted water produces disease; also that the purveyors of this foul water were culprits, and were just as deserving of castigation as those who trifle with and imperil the rights, the interests and the welfare of the people in any other way.

The student of social evolution is amazed by the world of new features that characterize modern life. One of these is the health officer. I shall, for convenience use the term health officer in the broad sense; not as strictly applicable only to that executive official, generally comprehensive of the functions of all whose duty involves the conservation of the public health. It may be assumed that authoritative effort in this field in Ohio is fairly well represented here to-night. Everyone knows that the officer of health is of recent origin. How many of those thus engaged have reached to a proper understanding of the dignity and importance of their vocation?

If few have done so it is little wonder. The fly-wheel of American politics never stops. Health officers come and go; contagion and infection go on forever. Sudden exigencies, sometimes as portentous as they are sudden, thrust new and grave problems upon the attention. If the officer of health has the advantage of a medical education he may know how to confront a threatening situation intelligently. Whether physician or layman he will naturally and properly seek for light in the printed bulletins of the State Board of Health which embody the best results of the world's experience. Compliance with the methods there clearly exposed brings forth good fruit, and the march of the destroyer is arrested. How have these methods been found out? Slowly, one by one. In them are entwined the prophylatic experiences and discoveries of the most wonderful century that now nears its end. The story of this beneficent evolution is too long; let the importance of it engage our attention briefly.

If small-pox could maintain its free course; if no restraint could be put upon it, of what use would be railroads and steamboats, those greatest triumphs of the mechanic arts? Until almost the beginning of the present century small-pox decimated cities, while their populations were yet small as compared to those of more modern times; it ravaged village and country. In its presence armies and navies melted away, and industry, travel and transport were dead. There was no remedy, no escape, except by flight.

Only six years ago a man in the first stages of small-pox got work in an iron foundry in Akron. In a few days there were fifty cases in almost as many homes. Under the direction of the city health officer and the secretary of our State Board of Health, the protective methods sanctioned by experience were enforced. There was criticism and opposition, but there was no more small-pox, not one case. The brand of pestilence had its temporary effect, trade and industry languished to the extent of hundreds of thousands of dollars, but everybody was vaccinated, the wound upon the municipality's prosperity was quickly healed, and the old-time comfort and well being restored. It was the work of the health officer.

If periodic invasions of cholera were still to be feared; if the pestilence could lay waste our cities, leaving death and destruction in its wake, terrorizing the people and paralyzing trade and industry, where would be the compensating advantages to us of telegraphs and the mechanisms of the farms and factories?

The extreme limit of human misery is reached in the South Asiatic countries in which cholera is endemic and continuous. No need of labor-saving machines there where the average price paid to labor is eight cents a day and board yourselt. The close companions of pestilence are want and poverty and famine. In the old days when cholera acknowledged no master, when it invaded the western hemisphere, the multitudes sickened and died, or they fled. Grass flourished in the streets of the great mart of commerce. No room, or time there for the arts of peace.

Five years ago the plague got as far west as New York Harbor where it was met and stamped out by the American officer of health. In the same year, 1893, it killed 6,000 people in one month in the one half of Hamburg that had polluted water supply; the other, or Altona half of the city going nearly scot free owing to its independent supply of pure and filtered water. The Hamburg exception only proves the wisdom of modern hygienic requirement. That city's wretchedness and desolation are well remembered. The spirit of progress, of life-giving industry had fled, and it was wooed back only when the authorities of health led the way with the assurance of a filtered water supply.

It is not any part of my intention to minimize either the achievement of inventors, or the far-reaching importance of them as contributors to the comfort and well-being of mankind. Nor can it be said that the parallelisms thus instituted are entirely apt. Nevertheless they are sufficiently so to suggest that in the passing years there have been other Richmonds in the field of philanthropic human endeavor besides the inventors whose deft handiwork amazes us by its cunning, and whose praises are on every tongue. I refer to the inventors and manufacturers of health; I refer to the officer of health, the minister and high priest of the propagandism of modern sanitation. Thanks to him, and to those who have preceded him in direct line of succession, those cataclysms of death, those wandering uncertain storms of disease, cholera and smallpox have been, or can be shorn of all their terrors.

But the beneficent work of the health officer is not yet finished. Will it ever be? Probably not until the millenium. Men are weak and timid. If you have ever undertaken to enforce compulsory vaccination you have found, in addition to the weak and timid, another and still more troublesome member of society, the bigot. Then there are the shortsightedly selfish, like those at Ashland, who, had they furnished pure water, might have saved money and precious lives. These must be counted with. Then there is the politician, who is always with us. He is not weak, nor timid, nor a bigot; he is simply a politician.

I will not dwell upon these phases of ignorance, and weakness, and selfishness, that are ever raising up impediments across the path of the missionary of health. Let us rather look back for a moment through the pages made luminous and glorious by well aimed and organized effort in combating plagues that are not exotic but indigenous; diseases whose seeds are everywhere present, awaiting only favorable conditions in which to multiply and become a menace to every household.

Typhoid fever is the typical scourge of unclean living. Eight-tenths of the bulk of the aliments employed for nutrition are water, and water is the vehicle of typhoid. The consumer of pure water is exempt. Vienna's typhoid death rate was 70 per 100,000 with polluted Danube water, with the introduction of spring water the rate fell 7 per 100,000, and has remained there. New York City, with protected surface water, has a typhoid death rate of 17; that of Chicago, using polluted lake water, is 84.

Many books would be needed to hold the examples of similar import that are on record. The Ashland jury therefore rightfully held that there was culpable negligence on the part of the water authorities; that by pursuing another course, and one in harmony with the results of municipal experience the man's life would have been saved. I will not weary you with examples. The annual reports of the Ohio State Board of Health are made voluminous by them.

One phase of typhoid is made especially plain by these reports. The health officer cannot exterminate typhoid by the process of segregation and isolation as he can do in the case of certain other contagions. He must have the co-operation of the local authorities or he is powerless. Take one example: The town of Salem, Ohio, has been a locus of typhoid for years. The municipal health officer has appealed to the State Board time and again. The last call was responded to by Dr. Byron Stanton in October last. Doctor Stanton emphasizes the conclusions of the previous investigations, attributing the sickness to foul water, and indicating the remedy—a pure water supply. He treats the subject most clearly and exhaustively, giving the number of the cases year after year, and showing that Salem has had a typhoid death rate of 105 per 100,000 of population, a rate that is not equaled in the published records of the cities of this country, and is only exceeded in the Egyptian cities of Cairo and Alexandria.

The Salem water works were built prior to the passage of the state law, in 1893, requiring the approval of the State Board for sources of public water supplies. Had the protective influences afforded by that law been available, the utilization of those surface and city contaminated waters, and their sequelae of disease and death, would have been prevented. The health officer and the several boards have done all they had the power to do. It is now a question of prudent engineering, and of dollars and cents. There still remains the remedy suggested by Dr. Rush. The courts of Ohio stand open as they did to the Wisconsin widow. But it is not conceivable that such a population as that of Salem will longer neglect a sanitary lesson the wisdom of which is confirmed by the experience, by the teachings, and by the practice of the most enlightened people of the world.

The lesson remains that the observance of sanitary methods, supplemented by eternal vigilance, has become a factor of health, happiness and long life of the very first order. The exotic, cholera, has been barred out. The natives, small-pox and typhoid, can be suppressed. The prevention of consumption has been made possible. Step by step methods for the prevention of, and immunity from diphtheria are getting the sanction of experience in the saving of a rapidly increasing percentage of lives. The ills chargeable to overcrowding, and foul air, and polluted water, and harmful foods are being, or should be suppressed by the health officer. London, the largest city in the world, had a death rate of eighty in one thousand in Queen Elizabeth's time; now that rate is nineteen. It has been the work of the officers of health.

Who invented the processes employed? To whom is the world indebted for this great salvation. These dread mysteries were cleared up step by step, and one by one. The names of those who led the way will one day take their proper places among the foremost benefactors of the human race. The story of their achievements, transcending the interest of the most romantic conception, is too long for a place here. Suffice it to say that the beginnings, the entering wedges, in almost every instance, were the work of obscure persons; of Caignard Latour the Frenchman, who first fixed the cause of contagious disease upon a living micro-organism; of Jenner, the Englishman who braved the contumely of his countrymen in vindication of his discovery of vaccination; of Koch, the German, whose deft hand exposed to the world the living causes of phthisis and cholera contagion. All three were country doctors of small practice, and without any standing in the ranks of the popularly recognized scientists of their day. These were not the first instances where blessings of most surprising significance were due to men of lowly pretensions. In a certain old book that you may have heard of, we find these words of the carpenter's son: "Learn of me, for I am meek and lowly, and ye shall find rest unto your souls."

With the co-operation of all the help that can be enlisted, there is no immediate danger either of over-production or under-consumption of that article, health. Our medical friends need not despair. Hygeia's rule will be undisputed only in the sweet bye and bye. Even if all the preventable maladies were prevented, our dependence on the physician would be diminished it is true, but by no means dismissed. As a class, the preventable diseases can only be prevented, not cured. This suggests the classification of all the maladies mortal flesh is heir to, under these three headings: First, the ills we bring upon ourselves; second, the ills that are derived from others; third, physical derangement due to both causes.

A man may gormandize, impairing his digestion; then dyspepsia steps in and may open any one or more of a hundred gateways for the admission of disease. Men expose themselves and become the prey of the torturing horde of rheumatisms and neuralgias. Men may frequent tir-tight political or religious meetings or theaters. Men may, and do, stupefy themselves with malt concoctions; they may, and do brutalize themselves with fiery alcohol, and thus wreck both body and soul. Men lose their health in getting wealthy; then lose their wealth in getting healthy. The passions open an easy and downward door to imbecility and epilepsy for men, and their posterity after them. "Human unsoundness is nearly universal; it is a question not of kind but of degree." Men may dim their eyes, and blunt their ears, and cram their stomachs, and wreck their kidneys, and sap their nerves, and become the prey and the victims of senility, of overwork, of inherited degeneracies, of congestions, of accidents, and quacks, and charlatans. All these, and a thousand more like them, must carry their complaints to the physician. The health officer can do nothing for them, unless it be to set them a good example.

It has always been characteristic of man to be prodigal and reckless with his health. No man would pour sand into the works of his watch; many men carelessly pour the sands of disease into the delicate structures of their own bodies. A late number of the Medical and Surgical Reporter tersely advises:

"Think deliberately of the house you live in—your body. Make up your mind firmly not to abuse it. Eat nothing that will hurt it. Wear nothing that distorts or pains it. Do not overload it with victuals or drink or work. Give yourself regular and abundant sleep. Keep your body warmly clad. This is the only body you will have in this world. Study deeply and diligently the structure of it, the laws that govern it, the pains and penalty that will surely follow a violation of every law of life and health."

While the health officer cannot suppress the gormandizer, or syphilitic, or the drunkard, the nature of his calling should make him a missionary of temperance; not the temperance of the faddists and politicians, but the temperance of moderation which is the granite pedestal under the feet of the goddess Hygeia. What a world of disease and distress would be banished if men would put in practice the motto, "Temperate in all things."

I have now spoken of the class of preventible diseases in the presence of which the health officer can say: "Thus far and no farther;" also the innumerable self-inflicted plagues that owe him no allegiance. To these must be added the third class, the bodily ills brought on by overcrowding, bad light and ventilation. In these respects he will be happy if an enlightened public sentiment, nourished and supported by a generous policy, shall come to his aid. Then, by the help of skilled architect and engineer, the obstacles to wholesome development and the conservation of healthy living may be suppressed.

I mentioned the faddist. Their name is legion. Sanitation is a comparatively new science. Superficial views of it have begotten scores of errors. Some are fallacies, and some are mischievous half-truths. In some minds there is lodged the idea that athleticism and health are convertible terms. Nothing could be further from the truth. If the athlete is healthy he is so in spite of, and not by virtue of, his most intemperate methods. Be he ever so healthy and muscular he may not survive the strains he puts upon his vascular system. Health is the outgrowth of good digestion, of temperate living, and not of undue development of muscle. A backward glance at the athletes of twenty or more years ago will show that a hale old age is not one of their rewards. That is reserved for such as have cared for their health and husbanded their strength for future need.

Another class of writers decry the double beds. They claim that only single beds can insure the sleeper's safety. In spite of all their arguments the double bed is in no immediate danger of extinction.

Exaggerated ideas and practice in regard to the prevalence of bovine tuberculosis have had the effect of bringing wise precautions into disrepute.

The dangers of contagion from the touching, tasting, eating, drinking, smelling and handling of almost every conceivable thing are occasionally, and judicrously exaggerated. Some rhymester sums up the situation in these sarcastic lines:

I am sumthin' of a vet'ran, just a turnin' eighty year;
A man that's hale and hearty and a stranger tew all fear;
But I've heard some news this mornin' that has made my old head spin.
And I'm goin' to ease my conshuns if I never speak ag'n.

I've lived my fourscore years of life, and never till to-day
Was I taken for a jackass or an ign'rant kind o' jay
Tew be stuffed with such durned nonsense 'bout them crawlin' bugs and worms,
That's a killin' human bein's with their miscroscopic germs.

They say there's "mikrobes" all round, huntin' for their prey;
There's nuthin' pure tew eat or drink and no safe place to stay;
There's "miasmy" in the dew fall and "malary" in the sun;
'Tain' safe to be out doors at noon or when the day is done.

There's "bacteery" in the water and "tricheeney" in the meat.
"Ameeby" in the atmospheer, "calory" in the heat.
There's "corpussels and pigments" in the human bein's' blood.
And every other kind of thing existin' sense the flood.

Terbacker's full of "nickerteen" whatever that may be,
And your throat will all get puckered with the "tannin" in the tea;
The butter's "oily-margareen," it never saw a cow,
And things is gettin' wus and wus from what they be just now.

Them bugs is all about us, jest waitin' for a chance
Tew navigate our vitals and tew 'naw us off like plants.
There's men that spends a lifetime huntin' worms jest like a goose,
And tackin' Latin names to 'em, and lettin' on 'em loose.

Now, I don't believe such nonsense, and don't intend to try;
If things has come to sech a pass I'm satisfied to die.
I'll go hang me in the sullar, for I won't be sech a fool
As to wait until I'm pizened by an annymallycool.

Our humorous friends have thrown much entertainment around the very ancient and persistent practice of kissing. Others of graver turn are the serious victims of the micro-osculation fad. Their dilemma lends itself gracefully to verse. A sample prescription is this colloqpy between a pair of lovers. The young male victim to microphobia, opens with this supplication:

HE.

Take, oh! take those lips away!
  Not but that I want to kiss them.
Not but that, believe me, pray,
  I most certainly shall miss them.
Heretofore, you know I've joyed
  In our frequent lip-communion;
  Never yet have I been cloyed
  With the sweets of labial union;
    'Tis on other grounds I say:
  "Take, oh! take those lips away!"

My decision is no whim,
  Due, my love, to fit of vapors,
'Tis the consequence most grim
  Of perusing doctors' papers.
For these journals now declare,
  With malign persistence, Beryl,
That each kiss in which we share
  Reeks (excuse the word) with peril.
    That is why I'm forced to say:
  "Take, oh! take those lips away!"

Ah, our lips we used to vow
  Were a hiding-place for Cupid.
Doctors, though, inform us now,
  Our belief was worse than stupid.
Microbes lurk, so they assert,
  In those highly-favored regions;
Germs infectious, to our hurt,
  Sally thence in countless legions.
    Own, then, there's some cause to say:
  "Take, oh! take those lips away!"

For myself I'd run the risk,
  I would face, with greatest pleasure,
Millions of atomic disks,
  For the love of you, my treasure;
But I feel concern for you—
  Such concern I cannot mask it—
And that you should face them too—
  No! I cannot, dare not, ask it—
    So, again, I sadly say:
  "Take, oh! take those lips away!"

SHE.

Try not thus to me dissuade,
  For in vain is your endeavor,
What, shall I shrink back afraid,
  When my Edwin dares? No, never!
Darling, you know well our case,
  Love has bound us in one tether,
So, if there be risks to face,
  We will face them both together,
    As you love me, then, don't say:
  "Take, oh! take those lips away!"

HE AND SHE.

We will never be coerced
  By the bullying bacillus,
Doctors, though they say their worst,
  With dismay shall never fill us,
Let us, therefore, both of us,
  Their last raven-croak dismissing,
Show that thus!—and thus! and thus!
  We still mean to go on kissing.
    Neither of us means to say:
  "Take, oh! take those lips away!"

It may be exceptional when such hallucinations work any real harm; but there are such exceptions. The hysterical propagandists of certain ideas wish to be exempt from the law requiring official notification of contagious diseases. The illegal practices of these people are commonly tolerated, but when they become a menace to the public health, the health officer draws the line thus (I quote from a daily paper):

Kansas City, Nov. 10.—Mrs. Amanda J. Baird, the Christian science healer, was fined $50 in police court to-day for failing to report to the board of health a case of diphtheria she was treating.

Here is another:

Mr. and Mrs. J. W. Keith were arrested to-day on a warrant sworn out by the city physician for not reporting the fatal case of diphtheria of their child, which had been treated by Christian science healers. The Keiths refuse to divulge the name of the healer in the case. This is the second fatal case of the disease treated by the scientists within a week.

Such examples need no comment. These weak-minded faddists can become the distributing agents of contagions as well as other people, and if such senseless "healers" are tolerated, they must at least be made to respect the quarantine regulations that are in force for the protection of society from infectious diseases

Since the coming of the son of man no veritable philanthropy has established itself among men without opposition. Human rights and freedom of conscience came to us of this generation through contentions and wars. The tree of civil liberty has been nurtured by rivers of blood. The majestic revelations of geology and astronomy have, at some time, been placed under the ban of church and state. Studious and thinking persons are not greatly surprised at the reluctant acceptance of the lessons that have come to us from the invisible world. The popular instinct yields even a more tardy faith to the microscopic revelations of the properties of things with which we are in hourly contact than to the almost inconceivable disclosures of science about the distant stars and rock formations of the earth. Little wonder, then, that the sea of doubt, lashed to fury by the opprobriums of the ultra conservatives, by the powers and prejudices of old and respectable regimes, has been slow to reach the level of tranquil conviction; nor that the mist of mystery and the fads and fogs of extravagant excesses have here and there beclouded its service. But the winter of cold unbelief has already been made glorious by the sunlight of experiment, of immunity, of prevention; the advance guard who carries the new gospel of safety and protection to the very homes and firesides of the people is the health officer.

Not long since I heard the address of a well known professor of physical science. He compared the lot of working men now with what it was a hundred years ago. He said many fine things. He declared that laborers are better fed, better clad, better educated, live more comfortably, have shorter hours of labor, have increased opportunities for recreation and instruction, have public parks and free libraries, and generally enjoy more of the luxuries of life. In giving the reason of these improved conditions he recited certain contributory influences, religious, political and social. "But," he went on to say, "the one great cause, without which philanthropy could have done little, has been the invention and extended use of machinery and railways." He said that more and more of the hard labor is done by machinery, by the cranks and cog-wheels undertaking the mechanical drudgery, and setting free the sentient thought for higher and more intellectual pursuits.

Now, these are fine sentences, but the impression left by them would be more in harmony with truth if certain "bottom facts," as the advertisers call them, had not been omitted from the enumeration of causes, such as the discovery of America, and the art of printing. But the gravest neglect of all was the speaker's total obliviousness of hygienic influences. Why, but for the discovery of Jenner it might be worth while to inquire whether the majority or at the least a very respectable minority, of his happy laboring men would not be in their graves, while every other man of the living, would be pock-marked as was the case a hundred years ago. There was no machinery to speak of before the horrid incubus of contagion and pestilence had been lifted from humanity's breast.

There never would,there could never have been any. Plagues were sure, immunities were brief; each generation was too busy repairing its own devastations, or those that had preceded it to give to the mechanic arts any impulse or impress that has remained. About all that has been done by mechanical invention to shorten and lighten the burdens of labor has been done within the lifetime of men now living. Their marvelous devices, and those who will utilize them, and those who made them, were protected while thus occupied by the broad shields of quarantines, of sanitary organizations; in short, by the officer of health. The achievements of industry in the promotion of human welfare were not overdrawn by our professor, only he omitted the mainspring, that power behind the throne which is greater than the throne itself.

See the spectacle presented in certain cities in these United States not more than three or four months ago. Entire populations were terrorized. Industry was paralyzed. Commerce was dead. The school houses were closed. Factories were shut. No time, or thought, or place for inventors or their inventions; and no need of any unless it was for some discoverer of a prophylaxis of yellow fever. It is true that in that gloomy despairing hour there were railroads and steamships, but even those masterpieces of skill were limited in their functions to the one duty of bearing fleeing fugitives to places of safety.

The good work of suppression of infectious diseases must not stop. Such is the evident wish of the President of the United States, in whose late message we find this paragraph:

"In further effort to prevent the invasion of the United States by yellow fever the importance of the discovery of the exact cause of the disease which up to the present time has been undetermined, is obvious, and to this end a systematic bacteriological investigation should be made. I therefore recommend that congress authorize the appointment of a commission by the president, to consist of four expert bacteriologists one to be selected from the medical officers of the Marine Hospital Service, one to be appointed from civil life, one to be detailed from the medical officers of the army and one from the medical officers of the navy."

It is thus that President McKinley evinces to the world his genuine philanthropy, carrying to his higher station as chief magistrate the same solicitude for the sanitary well being of all Americans that ever characterized him, while Chief Executive of Ohio, as the firm friend of the votaries of health in his own state. England rewarded her Lister with a peerage. The subventions of French and German governments preceded and promoted experiments and discoveries that have blessed the world. In light of what has been done to abate other contagions, the further toleration of yellow fever in America would seem almost to be a disgrace. Will congress heed the recommendation of the President? Failure to do so would be un-patriotic, un-American, a discord with those promises of future well being which are the highest and noblest characteristics of our age.

Zeal, knowledge and a wise and prudent firmness of purpose are indispensable equipments of those who are charged with the duty of the conservation of the peoples' health. We cannot all be doctors, or graduates of medical colleges, but I am of the opinion that it is no shame to be a layman in the ranks of this holy ministry. To be a good health officer involves only knowing what every intelligent citizen should know. Rather glory, then, that you, though a stranger to clinics, and therapeutics, and the other Greeks and Romans, have still been found worthy of so high a vocation.

The bottom personal factor of popular well-being in the future is the health officer. The wizard of invention may dazzle the superficial eye. His telegraphs and telephones, the thousand and one handy things he has wrought, are around and about us to comfort us every waking moment, and to whirl us swiftly over lands and seas while we sleep. We are creatures of present impulse. Out of sight, out of mind. We see and feel these things, and praise the authors of them, forgetting the great work of the long line of victors over contagious diseases; unmindful of the more quite, but nevertheless vital achievements of the wizards of health. The great trains and ships may come and go, but their most precious freight and cargo will be health.

It has been the characteristic of the inventors of devices that shorten labor and produce wealth, to hie quickly to the patent office and assure to themselves the increment of profit by their new labors, and fulcrums, and cranks, and pinions. It is the characteristic of the inventor of health that he goes out at once into the world and preaches his precious gospel to all the people without money and without price. It is the present use of the material products of skill that promote personal convenience; it is absence of all need of the health officer that is most to be desired. Man's highest estate can be attained only by the enjoyment of health, by the assurance of intelligently organized protection against the pitfalls and plagues which are a constant menace to the human mechanism, to that creation which is so often referred to as "God's noblest work." Nor has any exception ever been taken to the truth of the old maxim, unless it be the one implied by these lines:

> "Auld Nature swears the lovely dears
> Her noblest work she classes, O!
> Her 'prentice han' she tried on man,
> An' then she made the lasses, O!"

In his own estimate of his responsibilities, and of the honor attaching to them, let no officer of health give himself second place. Let him study and understand the true scope and meaning of his proper functions. Let him be impressed with the high and holy import of his calling to his fellow men. Let him plant his feet on the rock of law, when written, but let him be so imbued with knowledge that he can mount astride that higher law, "Salus populi suprema lex," when the emergency arises. Thus equipped, he will "go forth as a strong man to battle and to win the race."

The Chairman: Gentlemen, this paper is before you for discussion.

Dr. Davis: It seems to me that if there is anything to be added I do not know where it could come in. I think discussion is entirely out of place on that paper.

The President: The discussion of questions proposed by delegates will next be in order.

Dr. Probst: This question was handed in by Dr. Stewart, and is directed more particularly to the State Board of Health. I have a letter from the city civil engineer of Canton which embodies the matter in question, and Mr. Hartzell said he thought it was right to present this letter. The letter was sent to the board of health of the city of Canton, and is as follows:

January 6th, 1898.

To the Honorable Board of Health, Canton, O:

GENTLEMEN: My attention has been called to the matter of disposal of the contents of cess-pools as removed by the various excavator contractors, and the question has been asked if this matter could not be dumped into the main sanitary sewer, or into the disposal works, and worked with the city sewage. And if not, to suggest a method of disposal for such matter. This matter cannot be handled in the sewage works, for the organic matter contained therein is mainly in solution, the result would be to destroy the present degree of purification, and give us some sludge that would be difficult and expensive to handle. I think this matter can be disposed of readily by intermittent filtration on a special filter prepared at the sewage farm, and the work done under direction and control of the operators at the works, by the contractor who may draw such refuse to the works. I would suggest that your board appoint a committee, of say two members, to attend the annual meeting of the State Board of Health, in Columbus, this month, and there bring the matter up before the board. Any local board cannot afford to miss being represented at these meetings, as much general information on sanitary matters is there presented and discussed.

Yours respectfully,

L. E. CHAPIN, C. C. E.

Dr. Marchand, Canton: The question that confronts us is what we can do with our cess-pool and privy vault excrement? I have recommended for several years the construction of a garbage furnace, but the city has not seen fit yet to go to that expense. Gentlemen who represent other cities here of the same size as ours, have the same difficulty no doubt. Farmers and people who own land adjacent to the city, object to dumping this excrement there, and they go to the next farm and the next. Our city is situated in a basin and it is becoming a serious question. There are a good many people that will not live in sewer districts. The city will not be sewered entirely for many years, and the question is what can be done in the meantime with this excrement from the privy vaults and cess-pools? We must have a place to put it. What is the best means of disposing of it? I have recommended a garbage furnace, but if there is another method that would be more economical and as good and safe I would like to know it.

Prof. Reefy: Perhaps, Mr. Chairman, it would be well to postpone that question until to-morrow.

And thereupon, on motion, a recess was taken until nine o'clock A. M., January 20, 1898.

MORNING SESSION.

SECOND DAY.

The President, Dr. Hoover, called the convention to order at nine o'clock, pursuant to adjournment. He said, "There are quite a number of questions on the table here this morning, and as you are aware the program for the morning is quite full. What is the pleasure of the convention? Shall we take up the regular order or shall we devote a specified time to these questions? The reason I put it in that way is, that perhaps there are a number of persons who would like to hear the regular program, who are not yet here, and we could take fifteen minutes for the discussion of these questions, and at the end of that time go into the regular program without losing any time.

Dr. Kahle: I move that these questions be taken up for fifteen minutes and then the regular program commence.

Motion carried.

Question: What can township boards of health do to prevent the hauling of the contents of privy vaults from the city and depositing it in the township?

The President: I would suggest that some of the city health officers or municipal health officers answer that question.

Dr. Stanton: Mr. President, there is a law, I believe, covering the matter of disposing of night soil. I am not able now to quote the law, but there is in the Revised Statutes some place, a provision by which this material may be disposed of. When disposed of according to law, it seems to me that the health board or municipal board hasn't any power in the matter, but if carried out in accordance with the provisions of the law it seems to me it would not be objectionable.

Dr. Probst: Section 6923 of the Revised Statutes provides that "Whoever puts the contents of any privy vaults upon or into any lake, river, bay, creek, pond, canal, road, street, alley, lot, field, meadow, public ground, market space or common, shall be fined not more than $50 nor less than $10," there being a provision, however, that this may be trenched in trenches three feet deep, but to put it on the surface of the ground in any of these places named would subject the parties named to a penalty of "not more than $50; and in default of payment of said fine and costs be imprisoned not more than thirty days; but the provision hereinbefore made shall not prohibit the depositing of contents of privy vaults and catch basins into trenches not less than three feet deep excavated in any lot, field or meadow, the owner thereof consenting, outside the limits of any municipal corporation, and not less than thirty rods distant from any dwelling, well, or spring of water, lake, bay or pond, canal, run, creek, brook, or stream of water, public road or highway; provided, said contents deposited in said trenches or pit are immediately thereafter covered with dry earth to the depth of at least twelve inches."

Dr. Stanton: I was under the impression that there was a provision that it might be plowed under, not to a depth of three feet but a shallow depth. I was under the impression that there was such provision.

Dr. Probst: This section probably covers what you have in mind: "Nor shall said provisions prohibit the depositing of said contents into a furrow situate and distinct, as specified for said trenches or pit; provided, the same are immediately thereafter wholly covered with dry earth, by plowing or otherwise; and provided, also, that the owner or occupant of the land in which said furrows are plowed, consents, and is a party thereto, provided, also, that the board of health of any municipal corporation may allow said contents to be deposited within the corporate limits into trenches, or pits or furrows, situate, distant and to be covered as aforesaid."

The President: I take it that that answers the question. The next question is:

Question: Has a health officer any right or power to either condemn or prohibit the sale of vegetables exposed on sidewalks in front of a grocery?

Professor Reefy, Elyria: I do not know how it is in every place, but we have a good many dogs in our town, and they are not always as polite as dogs ought to be, and these vegetables which are on the sidewalks in front of groceries are seriously exposed to dogs. I would like some information on the subject.

The President: Will any one volunteer to answer that question?

Dr. Davis: I am inclined to think that the health officer has the power to regulate this. As I understand it, it is his duty to look after this. But the mere fact that vegetables are exposed upon the street is no proof that they are unfit for use.

Professor Reefy: What about the dogs?

Dr Davis: Well, if you can establish the fact that the dogs have been there, that's another thing.

The President: I think, gentlemen, that in questions of this kind the business interests of the dealer would determine the management of their vegetables, and if people wanted to buy them that is their business.

Question: When there are slaughter houses outside of a corporation and they become filthy and are ordered by the trustees to clean up and fail to do so, what should be the action of the board? The man who runs the slaughter house rents it. Who is liable for costs should suit be brought?

Dr. Probst: I think there is no question as to the authority of a township board of health to abate a nuisance of that kind and compel the occupant or owner of the slaughter house to abate it. Under the law the occupant may be arrested and prosecuted for maintaining a nuisance. That, however, would not abate the nuisance, but the owner of the slaughter house can be proceeded against by the board of health; and if he fails to abate the nuisance on the order of the board of health, the board of health itself can abate the nuisance and put the costs on the owner. That is my understanding.

Question: Can a township board of health appoint a township physician and fix his salary?

Dr. Spencer: The township trustees are authorized by law to appoint a physician. The board of health, I judge, has no authority in the matter.

W. L. Wear: Well, the township board of health and township trustees are the same thing in their official capacity as trustees.

Dr. Spencer: In their official capacity they are authorized to do this, not as a board of health.

Mr. Wear: I would like to know whether the township trustees have the right to employ a township physician under the present law?

The President: Will Dr. Spencer answer that question?

Dr. Spencer: I did not understand the question.

The President: It has been asked whether the township trustees have authority to employ a township physician under the present law.

Dr. Spencer: Under the state law recently going into operation, within the past year, the township trustees, with the consent of infirmary directors, are authorized to employ a physician. I know that is so because I have been employed within the last four months in our township.

Prof. Reefy: What has the board of health to do with that any way?

The President: Nothing.

Dr. Geo. R. Conard, New Vienna: I would state that the trustees of our township have employed me as health officer, and instructed me to bring in my bills for services. They also employed another physician to attend to paupers. There is quite a difference between a health officer and a physician for paupers, and they make that difference. I serve on fees and the other physician on a salary.

Dr. Davis: I would like to call attention to section 2121: "In each township the trustees of the township shall constitute a board of health, which shall be for the township outside the limit of any city or village, and such boards shall have the same duties and powers as are herein imposed upon or granted to boards of health in cities and villages. They shall annually elect one of their number president, and the township clerk shall be clerk of the board of health; they may appoint a health officer and as many sanitary officers as they deem necessary to carry out the provisions of this act." Now, it seems to me that they have the same power as conferred upon boards of health of cities and villages. There certainly ought to be no question about that.

Dr. Spencer: The gentleman does not take into consideration the difference between the health officer and township physician. The township trustees may employ a physician to attend the poor, the paupers of the township, and employ another physician as the health officer of the township. The duties are not alike.

Question: Can a man employed as a master or journeyman plumber be appointed a plumbing inspector?

Prof. Reefy: There is no law on that subject.

The President: Well, I am not so sure of that. Is there anything in the plumbing law concerning this?

Dr. Probst: It was announced here yesterday that that plumbing law has been declared unconstitutional.

The President: Has been declared unconstitutional perhaps within a few days.

Dr. Davis: Wasn't that a common pleas court?

Dr. Probst: I think that is true.

Dr. Davis: That was in the Law Bulletin, but that does not necessarily destroy the law. That decision would have to be upheld in the higher courts.

Question: In our village, of about 600 inhabitants, we have located on our principal residence street an old two-story brick house, formerly used as a school house. For some years this building has been used as a tenement house, all of the people in it are Polish and work in a phosphate works. The house is 30 x 48 feet. Stands in a lot about 40 x 100 feet. There is no sewer, only a large privy vault on the premises. The building now has eight rooms, the largest 12 x 14 feet, others 7 x 9 feet; here are housed fifty people—six women, thirty-three men, and eleven children. All of the waste water and much other matter is simply thrown out. The soil about the place has become pretty well saturated, and the smell, especially in warm weather, is very offensive. While there has not been much sickness in the place (a case of typhoid fever last year) it would, in case of an epidemic, undoubtedly become a hot-bed of contagion. What can the local board of health do in the premises?—South Brooklyn Board of Health.

Prof. Reefy: Abate the nuisance.

Dr. Probst: Mr. Chairman, that question is fully answered in section 2128. I want to say, if the health officers and members of boards of health would read the health laws more attentively they would not ask many of these questions.

The President: I have two other queries here.

Question: What jurisdiction has the board of health of a city over nuisances adjacent to, but just outside of the corporation?

Question: What shall be done about the interchange of pencils in our public schools?—A. D. De Haven.

Mr. Reefy: The answer is the same as the answer to the other question, abate the nuisance.

Dr. Davis: How are you going to abate it?

A Gentleman: The trustees of the township have authority in that matter.

The President:: That is answered fully in the law, just as fully as the other one, a specific plan for the abatement of nuisances. The time for interrogation has expired. Before asking for the regular order I want to announce for the information of the members, that the *Ohio State Journal* will publish Dr. Wise's paper in full in its Sunday issue. Those of you who desire this valuable paper, can secure it by buying a copy of the *Sunday Journal*.

Dr. Daugherty, Bucyrus: Would it not be a good thing to have extra copies of these proceedings printed, and have health officers distribute them to the boards of health in the towns?

The President: That is a question for the convention to determine. Of course it will be some time before they are printed. You mean extra copies of the *Journal*?

Dr. Daugherty: No, sir; extra copies of the proceedings of this convention, to be distributed to the boards of health and boards of education. I think it would be a good thing to have that attended to.

The President: It is a pretty expensive matter to publish these things, and it comes out of our own fund. We might have reprints made of that particular paper.

Dr. Chalfant, Bellefontaine: I heard that paper, and if possible I do think we ought to have it distributed in Bellefontaine to the school board and other places in the county.

The President: I would suggest that a request to the State Board would make us feel that we have a right to do it.

Dr. Chalfant: I make a motion that the board print Dr. Wise's paper for this purpose in sufficient numbers to distribute throughout the state to educators, as they seem to need education.

Motion carried.

The President: The first paper on the program this morning is entitled, "Should Typhoid Fever be Quarantined?" by Dr. Crossland, member of the State Board of Health.

SHOULD TYPHOID FEVER BE QUARANTINED?

By J. C. Crossland, M. D., Member State Board of Health, Zanesville.

Quarantine is used here in its common significance, isolation. The paramount, if not the sole object of quarantine, is to prevent or restrict the spread of disease. The highest accomplishment of quarantine is the total obliteration of disease, a degree of efficiency seldom obtainable. Quarantinable diseases are, therefore, of such character that isolation is contributory, if not essential, to the restriction and suppression of disease. Therefore, to determine whether typhoid fever should be quarantined, it becomes necessary to consider and determine, if possible, whether isolation would be effective in the restriction and extinction of this disease, and also what other benefits, if any, would result. Speculation as to the extinction of the disease would be fanciful, for that would require a state of sanitary perfection not achievable, and a degree of resistence to disease to say the least much to be desired. It will be of aid in the further consideration of the application of quarantine to typhoid to look into the nature and methods of communication of those diseases to which quarantine is applied. We may summarize this point as follows: All diseases may be considered quarantinable that are directly or indirectly contagious; that is, diseases which may be communicated by direct contact with the patient or through an atmosphere vitiated by the patient.

Such diseases as measles, scarlet fever, small-pox and diphtheria, serve as typical illustrations of quarantinable diseases. In medicine, as in most sciences, we have rules and exceptions; possibly exceptions are more abundant in medicine. However, in determining the essentiality of quarantine in the restriction of this disease, we will not, we trust, be expected and required to be governed by other than well established facts constituting the rule. Now, it would seem, therefore, that a conclusion is readily and easily reached, for it is a well established and well known fact that the disease is water-borne. Or, we may be more comprehensive and say the disease is created through the ingesta.

Keeping in mind the exceptions, it must be admitted that the disease may be under conditions of undue care, lessness and negligence, communicated through the atmosphere. But we venture the opinion that this method of communication is so rare as to entitle it to very little consideration.

The materies morbi in typhoid, as we all know, is the excreta, notably the alvino? Now, Can the application of quarantine in this disease be made effective in securing a proper disposition of the dejecta? If it can be made effective in this particular, the greatest usefulness therefrom would doubtless result. If it cannot be, it would be practically useless so far as the limitation of the disease is concerned.

I do not care to theorize on this point; but, suffice it to say, that in the present status of public opinion, it would do little good. From the preceding line of argument, then, it will be seen that we are forced to this conclusion: that, since typhoid is not communicable in the ways that render isolation effective in its limitation, quarantine cannot be recommended, unless it can be shown that it will serve other and useful purposes.

There occur to me a few advantages which might be derived from quarantining this disease, and which may be worthy of mention. Statistics are always useful and especially so when reliably collected.

Secondly—Quarantine requirements always lead to more careful and accurate diagnosis, and consequently more effective treatment.

Thirdly—It might serve in some instances to determine, or at any rate, to point to the source of the disease. For instance, if it appeared that the disease was prevalent in a certain part of a town, or a certain community, or neighborhood, more than elsewhere, it would suggest an investigation of the water supply; if common for that community, or if separate from a general supply.

Again, it might indicate the use of unwholesome water legitimately or illegitimately used by a dairyman. These indications would be more readily apparent to a health officer having knowledge of all cases of the disease prevalent.

It has not been attempted, in this hastily prepared paper, to do more than to skeletonize the subject.

Its elaboration is left for the discussion.

The President—Gentlemen, this paper is before you for discussion. Remember the terms of the discussion, three minutes, and no man to speak a second time until all have had a chance to be heard

Dr. Spencer: I agree thoroughly with the paper, that while typhoid is a communicable disease it is not a contagious disease, no more so than our oldtime ague or malarial fever. My way is not to quarantine the patient, but to quarantine the excreta. If that is thoroughly done, you limit the extent of the typhoid contagion. If the excreta is properly cared for, properly disinfected and taken care of, we will head off any such thing as a typhoid epidemic.

Dr. Probst: The question that very frequently comes to me as Secretary of the State Board of Health is, "Shall we placard typhoid fever?" I think it is being done in some of our towns and cities, and I should very much like to know if there are any members of boards of health or health officers here who placard typhoid fever? I think our rules and regulations ought to be as nearly uniform as possible, and in the line of the best direction.

Dr. J. W. Russell, Tiffin: I commenced to placard when cases were reported, but I found out that the doctors began to shield the family; that they don't like to have their houses placarded, even for diphtheria and scarlet fever, let alone typhoid fever, and a great many of our physicians didn't believe in that. I dropped it, for we could get better results by just having them report the cases; and we generally make an investigation and find out the cause, and I think we get better results.

Mr. Geo. Flammer, Covington: I have been placarding houses for typhoid fever until recently. The physicians say it is a failure, and there is no use in it, so we quit.

Dr. Cossitt, Conneaut: We have made a rule in Conneaut of placarding houses for typhoid fever ever since the establishment of the board, and as far as doctors are concerned we find no trouble whatever in having the house placarded. I believe that it is an excellent thing to placard houses for typhoid fever. Now occasionally you will find a case of typhoid fever in a boarding house, and if that is not placarded ten chances to one the inmates of the house do not know what the disease is, and the proper care is not taken and the boarders are put to the risk of contracting the disease; where, if the house is placarded, they can take their choice of remaining at that house or finding another boarding house. I think, for one, that cases of typhoid fever should be placarded just the same as any other disease; and I think it should be the object of health officers and boards to look into water supplies, and go over the premises and find where the trouble lies. When found, you will find a low well or some other cause that is productive of it. I had one case that came down in the middle of the winter. Now, the only thing I could find that was productive of fever—there were no other cases in town at the time—was the drainage from the sink. There were about twenty-five or thirty feet of old rotten wooden pipe, disconnected in a half-dozen places, and no vent in the sink, and I think that was the sole cause of the typhoid fever. It contaminated their food in some way.

Dr. Robertson, Germantown: I have listened to the arguments and the paper that was just read, and our custom has not been to placard a house with typhoid fever. In the case of typhoid fever if we should placard a house, we would have a great deal of trouble in getting the necessary attention and nursing that is required in that disease, because tpphoid fever at our place is dreaded almost as much if not more than small pox. We have a great deal of trouble already, and just as soon as you quarantine or placard it makes it a great deal harder to get the necessary attention. If the physicians will be careful to destroy the poison in the excreta, and give care to the surroundings, I think it is unnecessary to placard the houses, and all this quarantine can be avoided. We can get along a great deal better with the cases by giving them the necessary attention.

Dr. Chalfant: We use the placard in our city, but if the laws do not require it I will stop it.

Dr. Probst: There is no law requiring placarding any of the contagious diseases except the rules of the State Board of Health, which are in fact laws; but the rules of the State Board of Health do *not* require the placarding of typhoid fever.

Dr. Stanton: It seems to me that it is unnecessary to placard typhoid fever and it ought to be avoided. I think sanitarians, without exception, agree that typhoid fever is not a contagious disease. There are many diseases that are clearly contagious and ought to be placarded, but we ought to avoid as far as possible placarding of houses where no benefit can result in so doing. If we will limit the placarding of houses to those diseases that are generally contagious, or at all contagious, then we should more likely have the cases reported; but to put the family to the inconvenience causes physicians, to some extent, to fail to report these cases, and I think that typhoid fever, therefore, is one of the diseases that it should not be required to placard.

Dr. Heffner, Bellefontaine: The gentleman who just spoke says that typhoid fever is not contagious. I have had some trouble to determine the difference between infection and contagion. I know there is a general idea that you must come in contact with one and not the other, but, strictly speaking, that is not true. Diphtheria is not contagious, that is, you will not take it from the air being around the patient, neither will you take scarlet fever, neither will you take typhoid fever; but if you get any of the poison of the disease in your system, you will surely take it. If typhoid fever is infectious or contagious, then it is right and proper that the public should be protected from this disease. I should be sorry, indeed, to have our health officer fail to placard all houses containing typhoid fever or any other contagious or infectious disease. I believe that every house with either a contagious or infectious disease should be placarded and the public should be forewarned, because if it comes from their well, and if they drink water from that well, they will surely be infected and get the disease, if they will take it at all. I know there is a theory that we won't take a disease if we are in good health.

Dr. Stanton: Would you placard tuberculosis?

Dr. Heffner: It ought to be; yes, sir; it is contagious or infectious.

Dr. W. W. Ensey, Dayton: We all know that in hospitals there are frequently a number of cases of typhoid fever in the ward, side by side, and we have never experienced any trouble from it. I think, as Dr. Russell said awhile ago, the main thing to do is to get the physicians to report the cases, so the board of health can investigate the source of infection. I think we will have very little trouble if we can attain that object. The board of health then can take the necessary measures and see that the contaminated waters are not used. I see no reason why we should placard a case of typhoid fever. Typhoid fever is not a contagious disease. Indeed it is simply infectious. You will not contract the disease unless you get the germ into your system, through water or food. I should not favor the placarding of houses, but simply reporting to the local board for investigation, and I think you will find that to be the case in the large cities. I know I had some experience in hospital work in Brooklyn, New York, and the cases there were simply reported; and if a case was reported from the hospital they would not inspect that, but they would report the house from which the disease originated, and would send the inspector there to investigate that place. If he found the premises correct, it was all right, and if not, they took the necessary measures to suppress the disease where it started, and not in the hospital.

Dr. Cossitt: My idea was not to quarantine cases; it was simply to give a little more force to the idea of its being an infectious disease.

Question: Is it the rule of the State Board of Health to disinfect a room when a typhoid fever patient has been discharged?

Dr. Probst: Do you mean the rule of the State Board of Health? The rules of the State Board of Health require disinfection after the discharge of a typhoid fever patient.

The President: The next paper on the program is entitled "What can Boards of Health do for the Prevention of Consumption?" by Dr. J. M. Withrow, Health Officer, Cincinnati.

WHAT CAN BOARDS OF HEALTH DO FOR THE PREVENTION OF CONSUMPTION.

By J. M. WITHROW, M. D., Health Officer of Cincinnati.

When Robert Koch, in 1882, discovered the bacillus of tuberculosis, and demonstrated beyond the possibility of a doubt that causal relation it bears to the disease, he laid an obligation upon every organized board of health in the world.

The startling proportions of this obligation may be appreciated when we realize that the United States has an estimated population of nearly seventy millions of people, and that the experience of the past justifies the conclusion that nine millions of these human beings will fall a prey to consumption.

Shadwick, the English statistician, estimates that the value of a human life in England is equivalent to $980. Prof. Mason estimates it at $2,000 for the United States. Accepting the former estimate of $1,000 in round numbers as the value of a human life, we are appalled at the conclusion to which we are forced when the computation of the loss that will ensue to this country from the nine million deaths will reach the enormous sum of ten billions of dollars, enough to pay the National debt many times.

The fact that the disease, consumption, is due to a germ makes it, at least theoretically, preventable, and, if preventable, then boards of health should adopt every measure consonant with expediency and practicability to lessen the dissemination, and, as far as possible, to secure the destruction of the infecting germ. Efforts in this direction have in a large measure proved unsuccessful. So far as enforcing obedience to perfectly justifiable board of health regulations, the reason of this failure is not far to seek. No board of health regulation, however wise and however strongly justified, will meet with general obedience until the people whom it seeks to govern have been brought to a thorough realization of its wisdom and importance. The first step in the direction of preventing consumption must be the general education of the laity to the conception that the disease is contagious. Even now, so many years after the discovery and demonstration by Koch, we find the medical profession not wholly agreed upon the causal relation of the tubercle bacillus. The consensus of professional agreement, however, is so very general as not to greatly impede any steps that boards of health may take in an endeavor to restrain the ravages of this disease. The lack of general information on the part of the people at large, however, is so great as to largely deter the profession from hearty efforts to carry out board of health regulations.

IT IS CONTAGIOUS.

There is no question that the disease is as distinctly contagious as diphtheria or scarlet fever, but it would be absolutely impossible to enforce the same measures for preventing its dissemination as are followed in these acute maladies. If, however, the people generally understood that consumption is as contagious and as preventable as these acute diseases, there would be no great difficulty in carrying out such efforts as isolation and destruction of infected matter as is met with in the quarantine of these infections. No board of health would at present attempt to placard the house in which tuberculosis exists, and yet there is, perhaps, no less reason why this should be done than that the same plan should be followed in other contagious diseases. I believe, however, that the time will come when the practice will very largely prevail. It would, therefore, seem that the first step, the most important is to create among the people at large a correct impression as to the character of tuberculosis. If once you convince the public that consumption is not hereditary, you pave the way for the belief that the disease is contagious. It is not necessary here to argue the question. It is far more important to call attention to wise means whereby there may be a greater dissemination of general information upon this subject. To this end boards of health everywhere are beginning to avail themselves of the opportunities that the public press affords of reaching the people with plain statements of the absence of heredity and the contagious character of the disease and its method of causation.

The gratitude of sanitarians is due the public press. It has done much to create such impressions as outlined above in preparing the way for the enforcement later on of such precautions as will produce a strong approach to ideal prevention. The general belief in germs as causes of disease has been brought about by the secular press in far greater degree than all the volumes that have been written in medical and sanitary journals.

The first and foremost movement, therefore, incumbent upon boards of health, is the inauguration of a campaign of education. The people must be led through every possible channel to a proper conception of the cause of consumption. Circulars of information to patients, and appeals for assistance to the medical profession must be made in season and out of season until there is more general information upon the subject than exists at present. The New York Board of Health, which has largely been the pioneer in this field, has reached as near a general condition of public information as exists anywhere, and yet the situation there is not ideal by any means. In New York this campaign began in 1889. In that year a resolution was passed by the board of health asking for a report from the pathological department on the causation and prevention of pulmonary tuberculosis. This report embodied everything that was known on the subject at that time, and, in fact, about all that is now known upon this subject.

PREVENTIVE MEASURES SUGGESTED.

In this same report measures were suggested to prevent the spread of the disease: First—An endeavor to secure the public against tubercular meat and milk. Second—The dissemination among the people of just such information as we are discussing here. Third—The careful disinfection of rooms and hospital wards that are occupied or have been occupied by phthisis patients. This was practically all that was done by the New York board until 1894, when a general circular, containing the facts of the report above mentioned, was published. It was at the same time made obligatory upon physicians to report cases of pulmonary tuberculosis. That the law was not generally obeyed by the profession in the beginning is best shown by the fact that during the year 1894 only 4,166 cases of tuberculosis were reported to the health department, and during the third year of this practice, 1897, 8,534 cases were reported. The increase in the number of cases reported only indicates an increased observance of the law, not an increase in the actual number of cases.

Since the first movement in this direction in 1889, very much has been done in New York toward familiarizing the public with the contagiousness of the disease, and the purpose of the health department in relation to it.

Following the general lead of New York authorities, there has been considerable legislation upon the subject throughout the United States.

An investigation of the legislation upon the subject gives the following results:

Fourteen states have bovine laws and regulations, and issued circulars for public instruction with reference to tuberculosis in man—California, Colorado, Connecticut, Iowa, Maine, Massachusetts, Michigan, New Jersey, New Hampshire, New York, Pennsylvania, Rhode Island, Virginia and Wisconsin.

Two states have bovine laws, but do nothing toward stopping the spread of tuberculosis in man, i. e., Minnesota and South Dakota.

Tennessee has bovine laws, but can not enforce them for lack of funds, and the health board has only issued circulars upon the prevention of tuberculosis in man and beast.

The District of Columbia and Oklahoma have a law prohibiting the sale of tuberculous milk, but nothing concerning the disease in man and cattle.

Delaware, Indiana, Kentucky, Louisiana, New Mexico, Ohio, Texas and West Virginia issue circulars of instruction concerning tuberculosis in man, but no steps have been taken concerning bovine tuberculosis.

The remaining sixteen states have apparently done nothing to prevent the spread of tuberculosis either in man or beast. In about one-third of the large cities of the United States nothing has been done toward securing the prevention of consumption. This shows in a general way that as a country very little has been done toward putting in practice the realization that consumption is contagious, and therefore can be prevented.

In our own state, as has been observed in the preceding general statement, there is no law to prevent the sale of tuberculous milk, and no means are taken to prevent the spread of tuberculosis among cattle, and so far as tuberculosis in the human being goes, there is no legislation statutory in character upon this subject

It must be said, however, to the credit of the Ohio State Board of Health, that it has issued circulars of instruction on this subject, but their dissemination has not been general enough or frequent enough to create very much public feeling upon the subject.

In the city of Cincinnati within the past three months only have any steps been taken toward educating the public upon this subject. A board of health regulation has been adopted placing the obligation of physicians to report cases of tuberculosis upon the same plane as cases of diphtheria, scarlet fever and other infectious diseases.

In general this germ of consumption gains access to the body and produces the disease in four ways:

First—The respiratory organs.

Second—The digestive tract.

Third—Through and into the deeper layers of the skin.

Fourth—The generative tract.

The third and fourth are so rare as methods of infection that they may be dismissed from present consideration.

In the first place let us consider the most frequent and, therefore, the most important mode of contagion, the reception of the germs through the lungs and organs of respiration.

The organs of respiration being the seat of disease the excretions from this source in the form of moist exhalations and sputum constitute the great bulk of the cause of contagion.

It is against the sputum as the chief source of the germ of tuberculosis that incessant warfare must be waged through every possible avenue by which the public may be reached. It is along this line that boards of health can most efficiently inaugurate a crusade that will ultimately do more to stamp out the most deadly disease that flesh is heir to.

The practice of expectoration, which is probably the most flagrant public cause of the spread of consumption, is regarded in America as an inalienable right. The opposition which any attempt at its prevention produced at the beginning makes us wonder why it was not incorporated in the Declaration of Independence and in the national constitution.

The recent experience upon this subject in Washington, where one of the Judges of the Supreme Court was in offense, is a case in point of the tendency of those sitting in the judgment seats of the mighty and administering justice, and, at the same time, opening the box of Pandora upon the public highway to spread whatsoever salivary possibilities of infection they might possess.

Although it is only less than six months since this board of health regulation concerning expectoration in Cincinnati was adopted, it must be said to the credit of the people that, with here and there an exception, there has been no great opposition. Indeed, the action of the board of health has been quite generally sustained and I believe that even in conservative Cincinnati the time is almost arrived for the reasonable enforcement of the regulation.

The board of health regulation adopted in Cincinnati reads as follows:

Section 1. Spitting on sidewalks or floors of public buildings, halls, railway stations, stairways and public conveyances is frequently the means of communicating disease, and is hereby forbidden.

Sec. 2. Any person violating the above regulation shall be punished as provided by the statutes.

In posting this it has been the practice to set out in print in large letters the phrase "Communicating disease," in order to make that the salient point of the regulation, and in order to impress the public with the fact that there is danger in the sputum.

Passengers in street cars during winter, when cars are closed, often find it difficult to dispose of sputum in cases where there is any bronchial trouble. It is not an easy matter to provide suitable accommodations for these people. The use of the ordinary handkerchief will at least protect the floor, but it has many objections. It is difficult to secure the proper treatment of the handkerchief thus soiled, and when the sputum on it dries it becomes the insignia of infection whenever it is unfurled from the pocket of the owner and unfolded.

CONTAGION IN PUBLIC PLACES.

Various sorts of cuspidors and individual spit cups have been devised to meet the necessity of this situation. None of these have been very successful. For one afflicted with tuberculosis or bronchorrhea to draw from his pocket an aluminum or glass flask while sitting in a street car and use it as a sputum receiver would certainly make him the unpleasantly observed of all observers.

To place public receptacles for sputum in crowded street cars is well nigh impossible. I have thought that it would be wise, and not particularly objectionable if street car companies would provide Japanese crape paper handkerchiefs or napkins, which might be hung to the side of the car at the back of the passengers or some other convenient place, to be used and put in the pocket of the user and subsequently thrown into the fire. While these napkins, or handkerchiefs, would be somewhat expensive, the expense might be met in part by using them as a medium of advertising. For the same purpose a cheap cotton cloth, as cheese cloth, might be hung in the cars and printed with such advertising as would defray part of the expense.

The practice of using Japanese paper for handkerchiefs or sputum receivers, while new in this country, has been practiced for a very long time in Japan. It is well known that this very polite and innately refined people consider it the highest breach of decorum to expectorate in public.

The realization that the sputum and respiratory exhalations from consumptives are a source of contagion must lead to some steps in the direction of car disinfection. The general question of car sanitation is too large to be treated on this occasion. So much, however, of car sanitation as relates to the destruction of tubercular contagion is garmane to the present consideration. Our railway cars, both the ordinary coach and the Pullman, admit with equal freedom the consumptive and healthy passenger.

Provisions for receiving the sputum are only meagerly supplied. It is therefore deposited upon the floors, seats, window sills and in the Pullman cars unquestionably contaminates the upholstery and the draperies. The Pullman cars are used for long runs, particularly in winter time, in carrying consumptives into climates valuable for the relief of the disease. Its cars especially must become very generally infected. It therefore goes without the saying that boards of health should take some steps to secure car disinfection. This should be more especially enforced in Pullman cars, and in the winter season some of the railway companies, I understand, have taken some steps in this direction.

DISINFECTION OF CARS.

One division of the Big Four is reported to have systematic car disinfection. The first movement, perhaps, to secure this important measure would be the enactment of a law compelling the state or local boards of health to enforce a reasonable car disinfection. Cars should be readily disinfected by filling with dry formaldehyd gas in such quantity as recent experience has demonstrated to be sufficient for disinfection.

In addition to this, car floors and woodwork should be regularly washed with a washing soda solution and all upholstery should be treated to a powerful air blast before the formaldehyd disinfection. It is well known that an air blast at high pressure is very successful in cleansing all plush upholstery of cars. And, if systematically employed previous to gaseous disinfection, would probably meet some of the requirements as far as destruction of tubercular infection is concerned.

Another phase of this question which can be enforced without great difficulty is the disinfection and renovation of all residences or apartments in which consumptives have lived. As has been stated a very small percentage of the cases are reported to departments of health. Almost every case that dies, however, is reported to the proper department of record, with the cause of death attached. In all cases where deaths have occurred from tuberculosis, therefore, it would not be difficult for boards of health to placard the same until they have been disinfected or renovated in a manner satisfactory to the health department. This practice is carried on in New York, and the placard is left upon the door of the infected dwelling until such time as the disinfection has been done by the health department, and such renovation of walls, closets, floors, etc., has been done by the owner, as has been required in each case by the health department. The enforcement of this aspect of prevention is also another means of educating the people to the conception held by the department that the disease is unquestionably contagious, and that the apartments in which patients have died are regarded by high scientific authority as unfit for human occupation until they have been thoroughly disinfected.

From all that has been said it is clear that consumptive patients should be isolated from others so far as possible. Hospitals should never permit tubercular patients to occupy the same wards with others. Indeed, consumptives should be sent as far as possible from city environment to sanitariums prepared for their isolation. This practice has been growing in recent years, and in a number of the large cities of the country such suburban hospitals have been established, and are at present in operation.

In Cincinnati the hospital for the isolation and treatment of consumptives is a branch of the general city hospital. This hospital is located outside of the city limits, to the northwest of the city, upon an elevation of three hundred feet above the general city level. This practice has only been carried on during the past year, and the success attending the removal of patients and their treatment outside of the general hospital has been so great as to furnish the strongest argument for the continuance of the practice, and for its adoption elsewhere.

HOSPITAL PHYSICIAN'S REPORT.

The report from Dr. B. F. Lyle, the physician in charge of this isolation hospital, shows that the patients who have improved have made an average gain of fifteen pounds in weight, that many cases, sent out in the early stages of the disease, have been cured and sent to their avocations, and that the lives of those too far advanced to admit of cure have been greatly prolonged. Not only has this been the result of this isolation as a direct result, but who can tell the indirect result in removing these patients from the wards of the general hospital, as was formerly practiced, where they remained as a constant menace to all patients confined with them.

Another consideration of no small moment in this direction is the fact that these poor, afflicted creatures have been far more hopefully surrounded and made far more comfortable in the new environment of a suburban sanitarium, situated in the country, remote from the evil influences, both sanitary and otherwise, of a large city. Again, this practice of isolation, becoming more and more generally known, is a further means of educating the general public to the contagiousness of consumption, the fact which, above all others, must be kept to the foreground in our endeavor to solve the problem of tubercular prevention

Not only should the consumptive patient be isolated in general hospitals and as far as possible be removed from them, but boards of health should take every step in their power to secure the isolation of patients in private houses. Circulars of information upon this subject should be sent to all infected houses or given to physicians in charge of the cases, calling attention to the mode of contagion and the importance of destroying the same, and the further necessity of keeping susceptible persons from coming in unnecessary contact with those suffering from the disease. Homes, asylums, public institutions, factories and schools should receive frequent inspection by sanitary authorities, and those in charge of such institutions should have the necessary circulars of information constantly at hand. There should also exist a closer scrutiny of susceptible occupations, those, for instance, associated with dust of any sort. It is well known that the irritation of dust in the respiratory tract paves the way for an attack of the bacillus; the irritated mucous membrane falling a readier prey to the germ than the unirritated one.

In every large city there is another architectural abuse which it is the duty of health departments to point out, and, so far as possible, prevent, that is, the construction of houses in such close proximity as to leave insufficient room for ventilation. The back-to-back house construction, so called, should be condemned, a practice largely in vogue in cities where the individual lots abut or back up on the lots on the opposite street without an intervening alley.

Experience in New York has shown that tuberculosis is very much more prevalent in certain quarters of the city, and especially in those tenement neighborhoods in which this practice of extending houses back to the lot line and directly against the rear of another house simlarly situated exists.

It might be said, in this connection, that there is perhaps no disinfectant better than fresh air and sunlight, and, so far as may be possible, these should both be rendered possible to every living apartment, a condition which is not realized in the character of construction under discussion

Blind alleys should be opened out as a means of securing through and through ventilation in the neighborhood of large tenements. Very many of the difficulties incident to unhealthy and crowded constructions are almost beyond our control but such a relation should exist between the legal authority which supervises the construction of new buildings and the health departments that the continuance of this practice may be prevented. No building permit should be given for any construction without the consent and approval of the department of health.

We now pass to the consideration of the second mode of infection, namely, through the digestive tract. There is no question that the most frequent cause of tuberculosis in this direction is the use of the milk from tubercular cattle.

Nothing whatever has been done in the State of Ohio to legalize any steps looking to the prevention of this great source of tubercular contagion. Here and there some herds have been tested but usually as a private or scientific experiment. The State of Ohio should adopt a law similar to that in New York or Iowa, and the law should be vigorously enforced.

The board of health in Cincinnati proposes to take a step in this direction, even in the absence of legal authority. It is proposed to solicit a few well situated and well equipped dairies, and appoint a veterinarian of skill and ability and make the tuberculin test of all the cattle used in these dairies for dairy purposes, securing beforehand an agreement with the owner that the tuberculous cattle found at the time of the first test shall be destroyed or disposed of to the satisfaction of the health department. This test is to be made twice a year. To such dairymen as permit the department of health to make this test the department will give a certificate stating that such a dairy has been tested by the department and its cattle are free from tuberculosis. These certificates are to be published in the newspapers, and to be valid six months. At the end of that time another test is to be made, and the former certificates destroyed. This sort of credential, coming from the health department, will probably so increase the business of the dairymen in both quality and quantity as to justify him in disposing of or destroying his tubercular stock in the beginning. The department will reserve the right to withdraw his certificate, and make public announcement of the same unless he permits the department to apply the tuberculin test to every cow added to his herd after the original test has been made. This practice would, in all probability, make the business of the nontubercular herds profitable and practically compel other dairymen to free their herds from tuberculosis after the manner described above.

This practice at the same time would, through the public press, call the attention of the public to the fact that there are tubercular cattle used for dairy purposes; that there is tubercular milk, and that the practice of permitting the same to be sold is a manifest iniquity, which public opinion thus aroused would in time overcome. Here we see the importance of again and again calling the attention of the public to the need of protection in this direction. This practice would give an opportunity to call the attention of the public to the fact that this was another avenue of producing tuberculosis of which they are now ignorant.

This would lead to a step in the direction of diminishing the production of tubercular meats and gradually to efforts to prevent same from being sold to consumers. The relative danger, however, of tubercular milk as a source of infection is so much greater than that of tubercular meat that it would seem wise to at first expurgate the tubercular milk, and the expurgation of the tubercular meat would follow in the course of time.

INFECTION IN MARKETS.

Another means of infection by way of the digestive tract not so important, perhaps, yet worthy of consideration, is the exposure of various food products in the form of vegetables, meats, fish, game on stands or benches in open markets or in front of stores, where it is exposed to the dust of the street, which consists in part of dried sputum, which unquestionably brings to these provisions some of the germs of tuberculosis. The exposure of fruits to the same mode of infection, and in addition its exposure in the crowded apartments of fruit venders, should be interdicted. Who knows but that the bright rosy apples which have been rendered brilliant by friction and osculation on the part of the vender upon our sidewalks, may not only bear the germ of tuberculosis, but any other germ that may be found in the extensive flora of the mouth.

So much for the seed of this contagion. Now what of the soil? Every growth of vegetation presupposes not only the sower, but the seed and the soil, and here we have mainly considered only the seed. No doubt if we destroy all the seed there will be no crop, but what has been said clearly indicates the almost insurmountable character of the problem. Let us as boards of health also look to the soil. See that none of it lies fallow, that it is all vigorously cultivated, and so fertilized by exercise and fresh air that the seed can not resist the natural product of the soil.

When the tubercular sower goes out to sow, let us see to it that so far as the seed of tuberculosis is concerned, the respiratory tract and the digestive tract are waste places. Let the thorny vigor of resistance rise up and choke the destructive and insidious tares of tuberculosis.

Our duty is scarcely less important in this direction. Let us as urgently demonstrate to the people that there is a susceptible soil as that there is insidious seed. To this end show that heredity is susceptibility; that eternal vigilance in strengthening the vitality and avoiding the contagion will purchase freedom from this malady.

To this end we must ever be diligent in a persistent urgency of better living apartments for the poor; more park for recreation and breathing spaces, and better sanitary surroundings in the public school buildings. We must advocate and demand gymnasia and play grounds of ample extent in connection with school buildings in tenement districts.

Teachers should be compelled to instruct pupils in deep breathing exercises—respiratory calisthenics should be part of each school session.

And yet, again, in closing this already lengthy paper, I say let us at all times and in all places and on every occasion keep telling the people that consumption is contagious and can be prevented.

The President: Gentlemen, the paper is before the convention for discussion.

Dr. J. B. Alcorn, Gallipolis: Mr. President, I want to say that we have listened to a very instructive paper, but I think that, as the paper said, tuberculosis is hereditary, and I do not think that anybody will take exceptions to saying that the soil is hereditary. I think we ought to lay more stress upon that part of the paper which says the soil is the seat of tuberculosis, and try and prevent the raising of families from tuberculous people. Start with the seat of the trouble. I think too—though it was not mentioned in the paper—that syphilitic families will produce soil for tuberculosis.

Dr. Kahle: I will just say that the State Board of Health has prepared a circular on consumption, and has distributed it to all of the health officer of the state, as well as the teachers throughout the state, and also to the boards of health. We have samples of that circular here that can be procured by anyone wishing them, and we will supply them to any board of health in any quantity that they desire.

Dr. J. G. Reed, Elmwood Place: I have been greatly interested in Dr. Withrow's paper. In fact, it connects with some private investigations I have made along the same line, but nothing like so thorough. I think the paper is very commendable, aggressive, and it occurs to me that it is the duty of this body to secure through the State Board of Health, as far as possible, printed copies of Dr. Withrow's paper. I want to say, with reference to some features of the paper, that I have made some investigations with reference to the schools in Cincinnati. In fact, I sent out one thousand letters to as many teachers, asking them in the name of humanity to report back in reference to three points: First, the length of time they had taught school in Cincinnati; second, the number of pupils that had died of tuberculosis so far as they knew, and third, how long such pupils had remained in school after the teacher regarded them as physically unfit. These letters were sent out quite recently and already a very large per cent. of them have been answered. Gathering the facts from that source and from the reports of contagious diseases to the health board in Cincinnati, I am suprised to find such valuable data as has been gathered in that way; enough at least to suggest to my mind, and I think it would to any doctor who would investigate the subject, that the time has come for the medical profession to knock harder at the halls of legislation in this state for the purpose of putting in possession of the people the facts we have in reference to tuberculosis. We ought either to do that or stop talking about tubercular bacilli. I therefore have a resolution to offer, just as a means of bringing this up and finding out the feeling of the convention:

Resolved, That the statistical facts relative to tuberculosis in the schools, and practical means of preventing the spread of tuberculosis, justify the state and local boards of health of Ohio in urging the Ohio legislature to provide adequate revenue to enable the health officers of the state to have the public schools within their jurisdiction inspected as often as shall be necessary to reduce the spread of consumption (tuberculosis) and other contagious diseases in said public schools to a minimum.

Dr. Daugherty, Bucyrus: I think the State Board of Health has full power under the law to make any regulation they may deem best, and I suggest that they pass an order requiring all physicians to report tuberculosis to the health board; that they may distribute these circulars among them.

The President: Gentlemen, there is a resolution pending, but possibly if that resolution is introduced at this time it will cut short the discussion, and I suggest that we take up the discussion now and the resolution immediately afterwards.

Dr. J. E. Foster, Coshocton: This is a very grave question, and one I have given a great deal of attention; and while a great many of the diseases have been exterminated in the lower animals in this country I recognize that tuberculosis is much more difficult to deal with, because it affects a great many different animals as well as people. As to the different methods of acquiring the disease, as Dr. Withrow told us, I will admit that infection is undoubtedly the most common, and probably the most difficult to prevent. We should first teach the dairyman; let him know that tuberculosis in cows is the same disease as in people, and then impress upon him the criminality of selling diseased milk, or milk of diseased cows, and the criminality of disposing of the animal whose flesh reaches the table of some innocent consumer. Most of you know about what per cent. of the people of Ohio die from that disease, and that doesn't represent all the people affected. One out of every seven or eight deaths is from tuberculosis. Now, deaths from tuberculosis being constant and uniform you all know that most people seem to expect those things as unavoidable, fold their hands and not do much. Of course that is not right at all, and I feel as though the time has come when we all ought to be up and active trying to do more than we have in the past.

Dr. Probst: In regard to the State Board of Health passing an order requiring physicians to report all cases of tuberculosis, I will say that the State Board of Health, two or three years ago, sent a circular to every physician in Ohio. One of the questions asked, was whether it was considered desirable on the part of the physicians to enforce an order requiring reports of these cases. I think health officers will realize that they can do little in this matter unless they have the hearty support of the medical profession. The majority of those that answered thought it would be inexpedient to report their cases, so the State Board did not take action, believing it is better to wait until the people acquire the belief that consumption is contagious. I will call attention to the fact that while the legislature has not passed any laws bearing directly on tuberculosis, especially in cattle, that there is a section which would authorize boards of health to prohibit the sale of milk from tuberculous cows. Section 7458 of the Revised Statutes reads: "Whoever by himself or by his servant or agent, or as the servant or agent of any other person, sells, exchanges or delivers, or has in his custody or possession, with intent to sell or exchange, or exposes or offers for sale milk from diseased or sick cows, shall be punished by a fine of not less than $50.00 nor more than $200.00." So I think if the boards of health could prove that the cows were tuberculous they would have no difficulty in prohibiting the sale of milk from such cows.

Prof. Reefy: One of the strongest points to my mind in that paper was to educate the people; that's what we need, to educate the people.

Dr. Miller, Massillon: Some of our people will be going away soon on the train, and it seems to me in justice to the gentlemen on the program who have prepared papers, that we should go on until those papers are presented, in order that as many as possible of these people may have the benefit of the prepared papers. I would move, therefore, if in order, that the discussion of this resolution be set aside for the time being, and that we proceed with the regular order of business.

The President: The chair rules that the doctor is in perfect order, that it rests with the convention what they shall consider. I will, therefore, ask whether it is the pleasure of the convention to further discuss the resolution?

Motion carried.

The President: The next in order is a paper entitled "County Health Organization," by Dr. Edwin LeFevre, health officer of Sidney.

Dr. Probst: Dr. LeFevre is not able to be here. I received a letter from him yesterday saying that a very important engagement had called him away suddenly, but he sent his paper.

The President: What is the pleasure of the convention, shall it be read or simply read by title?

Prof. Reefy: I move that it be read.

Motion carried, and thereupon the paper was read by Dr. Probst.

COUNTY HEALTH ORGANIZATIONS.

By Edwin LeFevre, M. D., Health Officer, Sidney.

Organization is the secret of success in any movement or line of work. Other things being equal, that party or movement succeeds best which has the best organization to carry forward its work and advocate its principles. This statement, made general in its application, is most emphatically true of the enforcement of sanitary laws and the accomplishment of sanitary reforms. If we have failed or come short in our sanitary work in this State in the past, it is largely because our organization has not been what it should be. Our ranks have been broken in too many places, and as a result we have not presented a solid front to the enemy. One, if not the greatest cause of our failure to accomplish what we should, is the lack of organization by counties. We have a State Board of Health able in individual make-up and doing efficient and noble work for the state. We have many local boards of health which are doing a grand work in their respective localities. But what is still needed to enable our army to cope successfully with the enemy, is an organization between that of the state and local boards. The workers in the ranks are too far removed from the commander-in-chief, the grand column needs subdivision and battalion commanders. The matter of a county health organization was first suggested in the annual address of Dr. W. H. Cretcher, first President of the State Board of Health, delivered in this city October 19th, 1886. We desire to commend this very able address of Dr. Cretcher to all who are interested in sanitary work and organization. The matter of county organizations has been under consideration in this state we may say ever since the organization of the State Board, but never took practical shape until December, 1896, when the first county association of boards of health was organized in Ross county. A similar association was formed in Shelby county in February, 1897, since which time organizations of like nature have been perfected in Logan, Crawford and Wood counties. The object of these associations is to secure co-operation among the boards of health and to promote the sanitary interests of the county in which they are organized. All members of the boards of health and their officials in the county are eligible to membership. Meetings are held one or more times each year for the transaction of business and the discussion of sanitary questions. The officers of such an association should consist of a president, one or more vice-presidents, secretary, treasurer, and an executive committee. The executive committee may and probably should include the officers of the association. The members of this committee should be selected with care. It should be made up of persons not too remote from each other, and who will give some time and attention to its duties. These should be practically those of the association ad interim. It should especially see to it that an active board of health is organized and kept up in every city, town and township in the county, and as far as possible aid in the suppression of infectious and contagious diseases. To this end, the secretary should be kept informed, by weekly reports from the proper officer of each board, of all cases of infectious diseases that may occur within his jurisdiction.

There can be no question but that an association of this kind, properly officered and managed, would be of great benefit in promoting the sanitary condition of any county in which it exists.

While county associations of boards of health are bound to do good wherever organized, and their organization should be encouraged in every county, I am yet free to say that they do not fully meet the exigencies of the case. Not being legally constituted, they have no power to enact or enforce sanitary rules and regulations. They can only act in an advisory capacity. What is needed in this state, before we can hope to gain approximate perfection in our sanitary system, is a legally constituted county health authority. For this we must look to and demand future legislative action. This defect in our sanitary system might be met as it is in the State of Indiana, by constituting the board of county commissioners a board of health, with the power to appoint a secretary who acts as health officer of the county. In Connecticut, the superior court appoints a health officer for each county, who must be an attorney, and he in turn appoints the local officers. Of the workings of this law, I would beg leave to quote from a letter recently received from Prof. C. A. Lindsley, Secretary of the State Board of Health, New Haven, Conn. He says: "Our county health officers have worked a revolution in sanitary administration in Connecticut. The success of public sanitary administration depends upon the enforcement of sanitary law. There is no lack of good sanitary law almost everywhere, but it is not automatic. If it is the business of no one to see that it is obeyed, it soon becomes a dead letter. This is more true of sanitary law than of most other legislation. The secret is to find the way to enforce it. We think we have found the key to the problem." He also adds: "But mind you, keep the business out of politics. The poison that paralyzes all sanitary work is the popular vote. Any officer who is dependent upon that for his office cannot be relied upon for faithful service. It is as fatal to his official health as chloride of lime is to the bacillus of Eberth." To which we feel very much like saying "Amen."

Referring again to the admirable address of Dr. Cretcher, it is our opinion that we could not subserve the sanitary interests of our state better than by following out the recommendations made therein, viz: That we have in each county a county health officer, who should be a graduated physician of good standing in his profession. We would, however, make one change in his recommendations in line with what has been said by Prof. Lindsley, this officer should be appointed instead of elected, as we doubt not much better results could be secured in this way. The persons selected for this office should be required to have an adequate knowledge of sanitation and hygiene, and the collateral arts and sciences. He should have a general sanitary supervision of the entire county and its local boards of health, and receive enough compensation to enable him to give his time wholly to the work in hand. He should have an office in the court house, where all records pertaining to the same should be kept. All local boards of health, through their proper officers, should be required to make weekly reports of all births, deaths, and all contagious and infectious diseases to the county health officer, who should keep a record of the same, and in turn report them to the State Board of Health. Marriage licenses might, with great propriety, be issued by the county health officer, or at least they should be made returnable to him so that a record of the same might be kept. He should also have charge of all records and matters pertaining to the control of the practice of medicine and midwifery, as required by the Statutes and the State Board of Medical Examination and Registration.

In order that the proposed plan should be made effectual for good, the county health officer should have full authority to enforce action on the part of local boards, especially in regard to the collection and reporting of vital statistics to the extent of removal or suspending from office, if necessary, those who failed or refused to perform their duty. The county health officer should furnish all blanks required by the local health authorities, the expense of which should be born by the county, and the form of which prescribed by the State Board of Health.

The many and good results to be derived from adopting the plan as outlined by Dr. Cretcher, and which we have only briefly recapitulated in this paper, must be apparent to all who have studied the sanitary needs of our state, and the defects of our present code. Among them we might enumerate the following:

First—It would tend toward the creation of a class of trained sanitarians throughout the state, a condition that is certainly much to be desired.

Second—It would lead to a better and more uniform enforcement of our sanitary laws and regulations. By supplying the missing link it would make our sanitary system automatic; it is not so at present.

Last, but not least, it would enable us to create and keep up an accurate system of vital statistics, one worthy of our great and progressive state. Ohio, usually in the van in all these things which tend toward the enlightenment and progress of its citizens, is woefully deficient in the matter of collecting vital and mortuary statistics. In fact our statistics, as now collected, are little better than a farce. Manifestly, boards of health afford the best, indeed are the only proper channel through which to gather vital statistics. It is to be hoped that the Legislature will see the wisdom of so perfecting our sanitary system that this may be done in a manner that will reflect credit on our state.

The President: The paper is before the convention for discussion.

Dr. Robertson: That is a very good paper, and I have no doubt that if the suggestions were carried out in the State of Ohio, and especially in the different counties, the efficiency of the local boards of health and local health officers would be greatly increased. Now, in our county, Montgomery, I doubt if there is one township outside of the one in which I reside that carries out the provisions of the law with regard to boards of health. In our township we have a very efficient board of trustees, and they have organized as a board of health and they have done a great deal of good. Now, by having county organizations I think that this can be perfected, and the people will be educated and understand the importance of this matter. I know that our township trustees have been of great benefit to us there in eradicating contagious diseases from our midst. Only a short time ago we had a case of scarlet fever that came from Indiana, reported to the township board of health, and immediately steps were taken to quarantine and effectually destroy the germ and the contagion of that disease; and there wasn't any other case reported in the township. I think that paper is a good one; it is practical, and something should be done in that line.

Dr. George Conard, New Vienna: The suggestions made in the paper in regard to collection of vital statistics are very good. It is certainly a very important matter, and one that has been neglected in the State of Ohio; but at the foundation of this collection there is a defect that will have to be overcome. That is to secure the action of physicians who are not in the board or connected with the board of health, to induce them to make their reports to the health officer; make it obligatory to report to these health officers, and give them a compensation for making their reports. I believe they could not be compelled to make it without compensation. While the compensation would not be very great it would secure a correct collection of vital statistics throughout the state

Dr. Schueller: Would it not be advisable to have a committee appointed by this convention to draft a law and submit it to the Legislature, or have the State Board of Health do it. Let us do it at once. I think it an excellent plan to have county boards of health, and we ought to do something to carry out the intention of that paper, and see that such organizations are formed. I do not know whether it is proper on my part to make a motion to that effect, to have the plan of the paper carried out either by a committee from the Legislature or the State Board of Health.

Dr. Williams, Niles: I will make a motion that a committee of five including the Secretary of the State Board of Health, be appointed to draft a bill to be presented to the Legislature, providing for the organization of county boards of health.

Motion carried.

The President: I presume it is right that this convention instruct the committee what to do with the bill after it has been drafted.

Dr. Laudick, Lima: Will you suggest who appoints this committee.

The President: I was just going to inquire about that myself.

Dr. Probst: It seems to me that this matter ought to come before the house for discussion. There is something to be said on the other side. This is not a new question; it has been discussed for the last twelve or fifteen years, and I would like, before the convention takes action to present a bill to the Legislature, that we should have a little more discussion.

Mr. Oldham: I think this matter should be referred to the State Board of Health for such action is they deem proper. It would be a better plan to have them bring this matter before the Legislature. Let the State Board be the committee instead of appointing a committee.

Dr. Miller: This is a big thing, and I think we better not hurry it too much. It is not a new thing, as Dr. Probst has said. It has been thought over and talked over a great deal, and it seems to me that a wise way would be for this committee to be instructed to consider this matter carefully and present a report at the next meeting of this annual convention. Now, of course, that is putting it away for some time, but it is the only way to get a good solution. Now, our present health laws —I think we were two or three years working on those laws, and you would think to look them over and compare them with the old law, that a committee might have done that in a few days, or a few hours, but a great deal of work was put into that, and they came into these meetings and discussed them until finally the committee was ready to report what it considered a tolerably mature bill. Now, these county organizations can be made very efficient and a great help to health matters in the state; and it should be remembered that it is desirable—the people desire that we should not make any additional machinery. The people are reasonable, perhaps, that is they are not unreasonably close all the time—I think they are reasonably close. (Laughter.) I think, however, that when they are convinced that we want something that is going to be a benefit, that they will be willing to help the thing along. If this committee can be constituted to mature this legislation in such shape as to present it to the Legislature, so that in a couple of years we can get something good in this direction, we shall do very well. We will have to wait a little. In fact it is a waiting game. This idea of education has been brought out by a number of the papers to-day. I move that this committee report at the next annual convention.

The President: The chair rules that the amendment is in order.

Dr. Heffner: I would like to say, in opposition to this amendment, that a great many things occur in two years, and I hope we will not have to wait two years.

The President: I believe the amendment is one year.

Dr. Heffner: It seems to me that the State Board of Health have the matter of sanitary laws within their minds and hands better than any committee that can be appointed from this body. I am willing that this matter be referred to the State Board of Health, so they can draft a bill to submit to the Legislature that may be acted on this year, and everything settled, and settled better than it can be by a committee of five outside the State Board of Health. I think the gradation from the State Board of Health to the county organization, to the local board and township trustees will be better considered in a bill drafted by the State Board of Health than in any other way. I would certainly be in favor of putting this motion in such a way, if it can be done, that this matter be referred to the State Board of Health, that they may get immediate action through this Legislature, if possible, because two years is too long to wait.

A Gentleman: I agree with Dr. Miller, because we have laws regulating sanitary matters that are in force now, and this is only a county organization to educate the people with reference to observing law. Now, there are six or eight or ten counties in Ohio that have organized and that have county organizations, at the suggestion of the State Board of Health. I suppose every county in the state is represented here by health officers or trustees. If they are interested in having people better understand what they want, why, let them form a county organization the same as others have. That's what I am in favor of. Let this committee take it under consideration. I am opposed to asking our Legislature to pass laws that are not necessary at the present time.

Mr. Brobst, Niles: The gentleman who just spoke has given my views exactly in this matter. I think there is no need of any legislation on this matter. The counties can perform the work themselves, and do this work just as well.

Dr. Heffner: What good will a county organization do where you have absolutely no power to enforce its regulations?

Dr. Probst: I am surprised that Dr. Heffner should ask such a question as that. He has a very efficient county organization in his county. I had the pleasure of attending one of his meetings, and they are soon to hold their third meeting. I am sure they are doing very excellent work there.

A gentleman from Perry county: I would like to ask if there is anybody here representing Perry county? We have had representatives up here before. This is the second time I have been here; I am a trustee, representing a township board of health. Now, some gentleman said that every county in the state is represented here. I do not know whether every county in the state is represented here or not. I believe we have just as bright doctors and lawyers in Perry county as in any other county in the state, and if this thing is coming to a county board of health I believe we will have to leave it with the State Board of Health to call upon some of them to make an appearance. I am neither a doctor nor a lawyer, but I think Perry county ought to be represented here just the same as any other county.

Dr. Robertson: I do not think we really need any legislation on this subject, and I would make this suggestion—I think the State Board of Health is perfectly competent, and they are the right ones to take hold of this matter. If there is a statutory law requiring the township boards to organize, let them enforce it in every township in the state; let the township boards of health get together and form county boards of health, and then we will have county boards. I do not think we really need much legislation on the subject.

The President: The chair would like to say that it has occurred to him a number of times that the parliamentarians would like to criticise his presiding. It is a fact that much of the discussion that goes on is entirely irrelevant. I am just as conscious of this fact as anybody, but we have been in the habit of having a sort of go-as-you-please in this convention. The majority of the members are not trained parliamentarians, and the present incumbent of the chair does not claim to be. The object has been to bring out every possible point in order and out of order, in season and out of season. I want to say one word concerning the question that is before the body—the motion of Dr. Miller to have this committee report at the next meeting. I want to express, as a member of the board, my opinion that it should be a committee from this convention and not a committee of the State Board of Health, that a year's time is not too far, nor two year's time. It is not a new question, as Dr. Miller has already said; it is a question whether it is advisable to do it at all in a legislative way, and I am in favor of the amendment of Dr. Miller, and hope that it will prevail. If it comes to a tie I will decide in that way. If I recall the question, Dr. Williams offered a motion that a committee of five, with the Secretary of the State Board, be appointed to draft a law providing for the organization of county boards of health, and Dr. Miller moved to amend by stating that the committee should report at the next meeting of this convention.

Dr. Miller: That a committee should report—not necessarily report legislation, but report as they think best. Give us information as to just what is best to be done.

And thereupon the amendment offered by Dr. Miller was submitted to vote, and carried by a large majority.

And thereupon the original motion as amended was submitted to vote, and was also adopted by a large majority.

Question: It being true that there is a cheap spurious compound of metal used in electrotyping that produces diabetes, as is shown by chemical record of a number of cases, is there a way to suppress it?

Dr. Schueller: I think the law provides for that already.

Question: Should adult members of a family where children have measles be prevented from going in and out to business?

Answer: No.

Question: What is the difference between typho-malaria and typhoid fever? Second: Must the attending physician report such to health boards? Third: Have local boards authority to condemn houses deemed unfit and unhealthy for persons to live?

The President: I think probably the first question is hardly in order in a body of this kind. The second: "Must attending physicians report such to health boards?" Third: "Have local boards authority to condemn houses deemed unfit and unhealthy for persons to live in?

Dr. Schueller: I can give the same answer as for the other. The law provides for that already.

The President: It is just as Dr. Probst said a little while ago, if health boards would study the health laws a little more they would not ask a great many of these questions.

Question: Where there is a case of typhoid fever in a family, should the children from that house be permitted to attend school?

Dr. Miller: There is no reason why they should not.

The President: I think so.

Question: Why should not local boards of health make a levy and have charge of their own sanitary funds?

The President: The only reason I can give to that is because they can't. (Laughter.) The law doesn't provide for it.

Here the President again read the resolution in regard to the inspection of schools offered previously by Dr. J. G. Reed.

Dr. Schueller: I would answer that resolution in the same way as I did the other. It is covered by section 2135: "The said board is hereby required to inspect semi-annually, and oftener, if in the judgment of the board it shall be deemed necessary, the sanitary condition of all schools and school buildings within its jurisdiction, and may, during an epidemic or threatened epidemic, close any school and prohibit public gatherings for such time as it may deem necessary."

The President: What shall be done with the resolution?

And thereupon, on motion, the resolution was tabled.

Adjourned.

INDEX.

Antitoxin—
  report on treatment of diphtheria with.. ... 137
Boards of Health—
  in Ohio... 9
  list of... 165
  meeting of ... 217
Bluffton—
  disapproval of sewerage for ... 28
  sewerage for ... 78
Boys' Industrial School—
  report on typhoid fever at ... 41
Bucyrus—
  disapproval of additional sewerage for ... 22
  additional sewerage for ... 79
Cambridge—
  sewerage for ... 14
Canton—
  additional water supply for... 14, 47
Cemetery—
  drainage of, at West Milton... 136
  pollution of creek by drainage of, at Newton Falls... 24
Census bureau—
  in reference to establishment of a permanent... 13
Cesspools—
  disposal of contents of... 275
Chagrin Falls—
  approval of water supply for... 12
  water supply for... 50
Chillicothe—
  meeting of boards of health of Ross county at ... 10
  sewerage for ... 14, 79
  approval of plans for sewerage for ... 17
Cincinnati—
  approval of sewerage for ... 12, 28
  additional sewerage for ... 83, 84
Columbus—
  committee on inspection of sewage farm for... 12
  pollution of water supply of ... 26
Consumption—
  what can be done for the prevention of... 285
Dayton—
  smallpox at... 31
Dead bodies—
  committee to revise rules on transportation of... 13
  meeting in re transportation of ... 21
Delhi—
  diphtheria at... 35

Delphos—
  approval of sewerage for ... 23
  sewerage for ... 85
Diphtheria—
  Delhi ... 35
  Findlay Orphans' Home ... 36
  Greenfield ... 37
  Newark ... 38
  Somerville ... 39
  Waynesfield ... 460
  treatment of with antitoxin ... 137
  bacteriological diagnosis of ... 260
Disinfectant—
  the present position of formaldehyde as a ... 240
Disinfection—
  discussion on ... 242
Educational methods—
  evil results of present ... 249
Formaldehyde—
  the present position of as a disinfectant ... 240
Galion—
  additional sewerage for ... 13
Gibsonburg—
  approval of water supply for ... 23
  water supply for ... 53
Glenville—
  disapproval of plans for sewerage for ... 12
  approval of plans for sewerage disposal for ... 22
  sewerage for ... 86
  sewage disposal for ... 92
Greenfield—
  diphtheria at ... 37
Greenville—
  approval of change in plans for sewage disposal at ... 12
  change in plans for sewage disposal at ... 106
Hardin county Infirmary—
  approval for sewage disposal for ... 28
  sewage disposal for ... 107
Health—
  inventors and manufacturers of ... 266
Health officers—
  list of ... 165
Health organizations—
  in counties ... 295
Hiram—
  approval of water supply for ... 12, 14
  water supply for ... 54
Hyde Park—
  sewerage of ... 17, 107
Institution for the Blind, Columbus—
  water supply for ... 51
Ironton—
  smallpox at ... 33

Lakeside—
water supply of 18, 26, 56
typhoid fever at 28
Lancaster—
water supply of 16, 57
Leesburg—
nuisance at 135
Leprosy—
quarantine of 149
Lorain—
approval of water supply for 28
examination of water supply of 18
report on mechanical filtration of water supply of 154
Measles—
quarantine of 149
Mechanical filtration—
report on at Lorain 154
Memorial—
on death of E. T. Nelson 30
Miami University—
sewage disposal of 10, 108
Middletown—
approval of sewerage for 12
sewerage for 111
Milk—
methods for the examination of 222
prevention of diseases communicated by 231
discussion on selling of 234, 247
Monroeville—
approval of water supply for 28
water supply for 62
Mortality reports—
from cities by months 180–203
from cities for the year 204–205
from villages for the year 206–212
summary of 213
Mt. Vernon—
approval of sewerage for 23
sewerage for 112
Nelson, Edward T.—
memorial upon the death of 30
Newark—
diphtheria at 38
New Straitsville—
closing of certain wells at 13
Niles—
sewerage for 17, 115
Nuisance—
at Leesburg 135
abatement of 277
Ohio Penitentiary—
smallpox at 31
Orphans' Home, Findlay—
diphtheria at 36

Physician—
  authority for appointment of township ... 278
Plumbing inspection—
  discussion on resolution in re ... 247, 248, 279
President's address—
  Thos. C. Hoover, M. D ... 219
Privy vaults—
  disposal of contents of ... 246, 275, 276
Resolution—
  in re topographical survey ... 27
Sabina—
  approval of water supply for ... 28
  water supply for ... 65, 67
Sewage disposal—
  at Glenville ... 22, 92
    Greenville ... 12, 106
    Hardin County Infirmary ... 28, 107
    Miami University ... 108
    Shelby ... 27
    Shepardson College ... 23, 117
    State Hospital for Insane, Toledo ... 12, 118
Sewerage—
  in Ohio ... 8
  for Bluffton ... 28, 78
    Bucyrus ... 22, 79
    Cambridge ... 14
    Chillicothe ... 14, 17, 79
    Cincinnati ... 12, 28, 83, 84
    Delphos ... 23, 85
    Galion ... 13
    Glenville ... 12, 86
    Hyde Park ... 17, 107
    Middletown ... 12, 111
    Mt. Vernon ... 23, 112
    Niles ... 17, 115
    Wyoming ... 14, 126
    Youngstown ... 127
    Zanesville ... 28, 133
Shelby—
  approval of sewage disposal of ... 27
  approval of water supply for ... 12
  water supply for ... 69
Shepardson College—
  approval of sewage disposal of ... 23
  sewage disposal for ... 117
Slaughter houses—
  regulation of ... 278
Smallpox—
  in Ohio ... 5
  at Dayton ... 31
    Ohio Pentientiary ... 31
    Ironton ... 33
    Toledo ... 34

State Board of Health—
  members of.... 4
  meetings of....5, 10, 13, 16, 18, 24
State Hospital for Insane, Massillon—
  report on water supply for.... 19
State Hospital for Insane, Toledo—
  approval of plans for sewage disposal of.... 12
  sewage disposal of.... 118
Streams—
  examination of....15, 16, 20, 24
Toledo—
  smallpox.... 34
Topographical survey—
  resolutions in re.... 27
Tuberculosis—
  in Ohio.... 6
  tuberculin test for in milch cows.... 11
  quarantine of.... 149
  what can be done for the prevention of.... 385
Typhoid Fever—
  at Boys' Industrial School.... 41
  at Union Station.... 54
  quarantine of.... 281
  placarding in.... 282
Union Station—
  typhoid fever at.... 45
Warren—
  pollution of creek near.... 24
  water supply of.... 29
Water supplies—
  in Ohio.... 8
Water supply—
  for Canton....14, 47
    Chagrin Falls....12, 50
    Gibsonburg....23, 53
    Hiram....12, 54
    Institution for the Blind, Columbus.... 51
    Lakeside....18, 26, 56
    Lancaster.... 57
    Lorain....28, 154
    Monroeville....28, 62
    Sabina....28, 65, 67
    Shelby.... 12, 69
    State Hospital for Insane, Massillon.... 19
    Warren.... 29
    Wauseon....17, 73
    West Alexandria....28, 74
    Wooster....28, 76
Wauseon—
  approval of water supply for.... 17
  water supply for.... 73
Waynesfield—
  diphtheria at.... 40

West Alexandria—
  approval of water supply for..................... 28
  water supply for........................ 74
West Milton—
  report on drainage of cemetery at... 136
Whooping Cough—
  quarantine of.. 149
Wooster—
  disapproval of water supply of................ 28
  water supply 76
Wyoming—
  disapproval of sewerage for.. 14
  sewerage for 126
Youngstown—
  sewerage of.. 127
Zanesville—
  approval of additional sewerage for 28
  additional sewerage for 133

COLUMBIA UNIVERSITY LIBRARIES

This book is due on the date indicated below, or at the expiration of a definite period after the date of borrowing, as provided by the rules of the Library or by special arrangement with the Librarian in charge.

DATE BORROWED	DATE DUE	DATE BORROWED	DATE DUE
C28(1141)M100			